Doc. no. LEC-OM05607

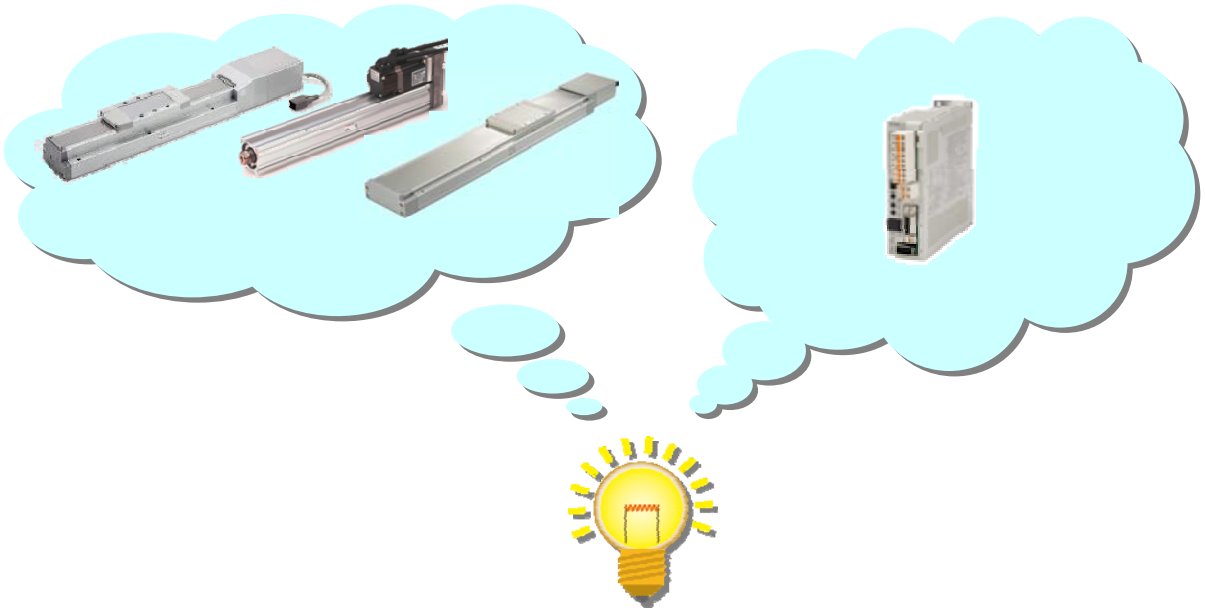
Operation Manual
(Simplified Edition)

PRODUCT NAME

AC Servo Motor Driver
(Pulse input type/Positioning type)

MODEL / Series / Product Number

LECSA Series



SMC Corporation

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LECSA Series / Driver Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS) *1.) and other safety regulations*2.).

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
ISO 4413: Hydraulic fluid power -- General rules relating to systems
IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -- Safety
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery – Electrical equipment for machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety. etc.

*2) Labor Safety and Sanitation Law, etc.

Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

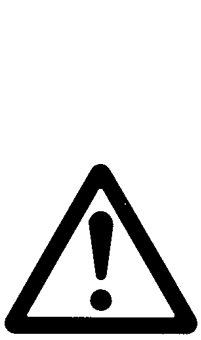
4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and lock circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3) An application which could have negative effects on people, property, or animals requiring special safety analysis.
4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Note that the ⚠CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.



LECSA Series / Driver Safety Instructions

Caution

The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries; consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*3.) Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***3.) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

Introduction

It is recommended that the operator read the operation manual for LECSA prior to use. For the handling and details of other equipment, please refer to the operation manual for said equipment.

Check that the main circuit power supply (AC100V/AC200V) and controller circuit power supply (24V) are wired correctly. Please refer to chapter 3.1 of the “LECSA Operation Manual” and chapter 2 of the “LECSA Operation Manual (Simplified Edition)” for details.

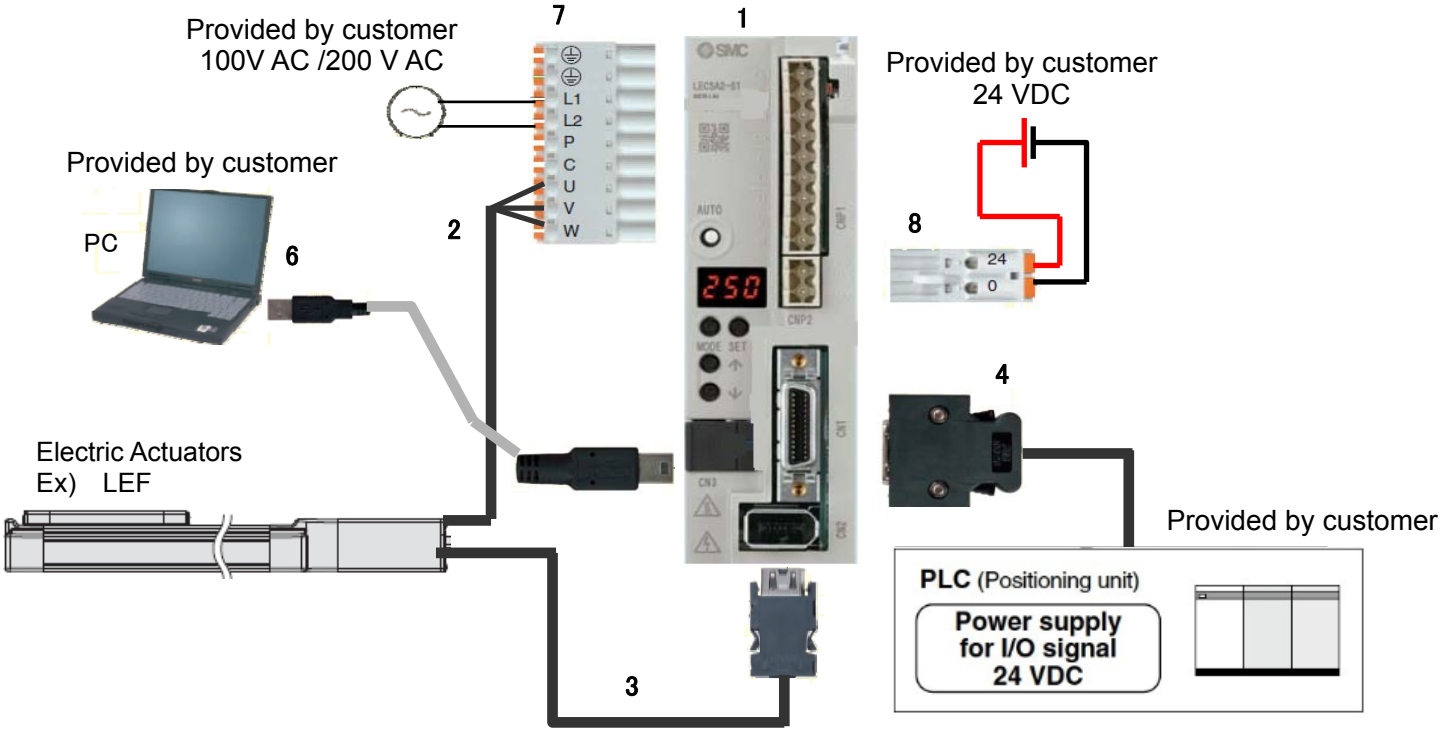
When setup software (MR Configurator) is used, the LECSA□-□ model selection is required. Select ' MR-JN-A ' through “Model Selection" - "System settings" - "Setup" and "Project name".

Terms

Position control mode (pulse)	Control the motor rotation speed and direction with pulse train and perform positioning.
Positioning mode (Point table)	Set the positioning data, rotation speed, Acceleration/Deceleration time constant of the drivers point table and execute ON/OFF control of the positioning operation using the I/O signals (a maximum of 7 points can be used for the point table configuration).

1. Configuration

Minimum equipment and wiring requirements to get started

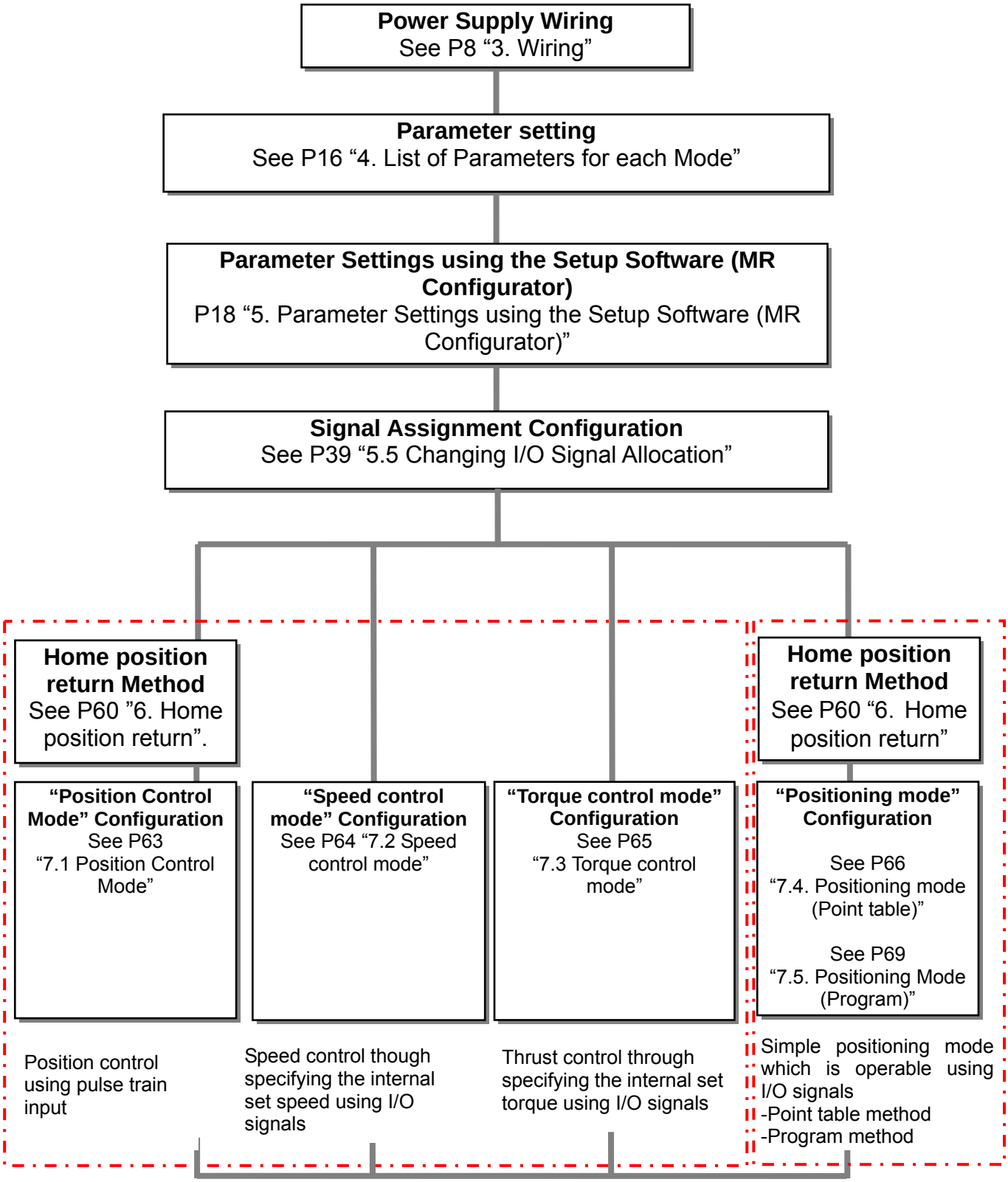


1	Driver	LECSA*-S*
2	Motor cable	LE-CSM-***
3	Encoder cable	LE-CSE-***
4	I/O connector	LE-CSNA
	I/O cable	LEC-CSNA-1
5	USB cable	LEC-MR-J3USB
6	Setup software (MR Configurator™)	LEC-MR-SETUP221
7	Main circuit power supply connector	CNP1 (Accessory)
8	Control circuit power supply connector	CNP2 (Accessory)

Note) The lock cable option is not shown on this drawing. Refer to the “LECSA Operation Manual” for details.

2. Pre-Operation Procedure

2.1 Flow chart


Power Supply Wiring
See P8 “3. Wiring”
Parameter setting
See P16 “4. List of Parameters for each Mode”
Parameter Settings using the Setup Software (MR Configurator)
P18 “5. Parameter Settings using the Setup Software (MR Configurator)”
Signal Assignment Configuration
See P39 “5.5 Changing I/O Signal Allocation”
Home position return Method
See P60 ”6. Home position return”.
“Position Control Mode” Configuration
See P63
“7.1 Position Control Mode”
“Speed control mode” Configuration
See P64 “7.2 Speed control mode”
“Torque control mode” Configuration
See P65
“7.3 Torque control mode”
Home position return Method
See P60 “6. Home position return”
“Positioning mode” Configuration
See P66
“7.4. Positioning mode (Point table)”
See P69
“7.5. Positioning Mode (Program)”
Position control using pulse train input
Speed control though specifying the internal set speed using I/O signals
Thrust control through specifying the internal set torque using I/O signals
Simple positioning mode which is operable using I/O signals
-Point table method
-Program method

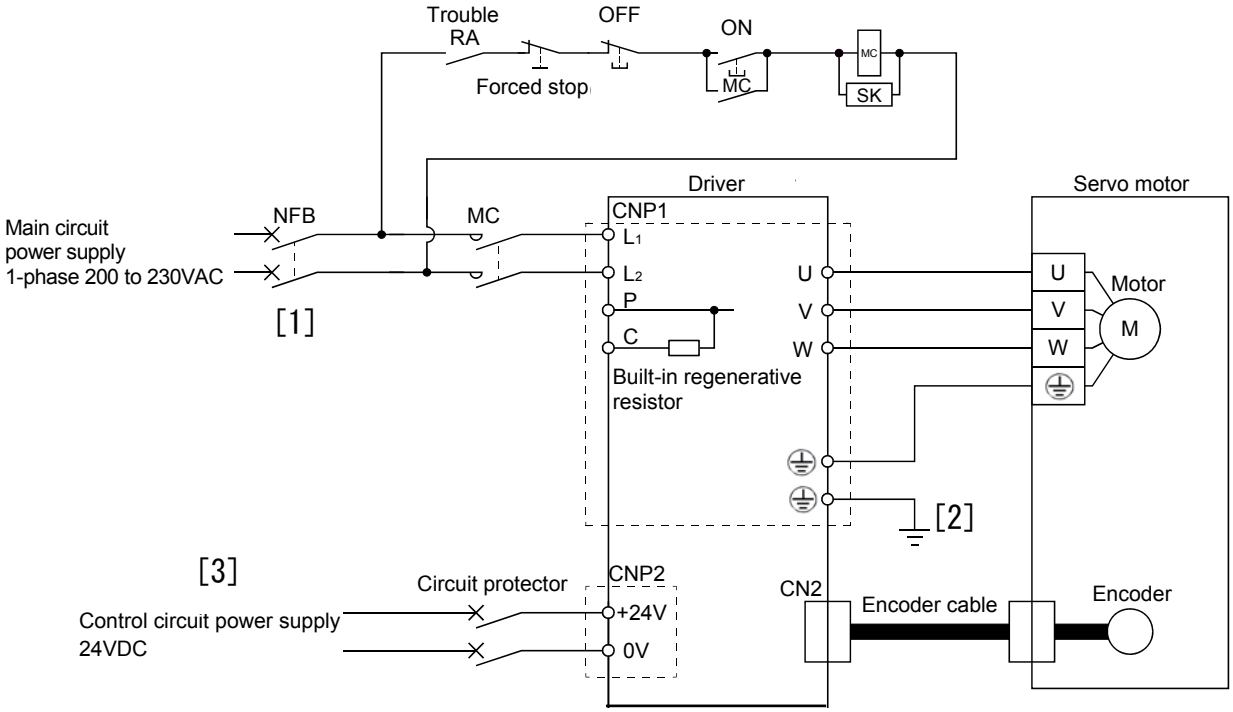
3. Wiring

3.1 Power Supply Wiring

Connect the actuator and driver power supply. This wiring diagram is common for each mode.

(1) LECSA (Incremental encoder)

EX.) Power supply voltage is 200VAC single phase



[1] Power supply input terminals, L_1 and L_2: Specify power supply to input terminals L_1 and L_2.

[2] Connect the motor power supply input terminal (U, V, W) to the driver power terminal (U, V, W).
Connect the motor ground terminal to the driver ground terminal.
Connect the encoder cable.

[3] Connect the 24VDC external power supply to the power supply for control circuit.

Refer to “LECSA Operation Manual”, Chapter 3 for further details if the power supply voltage is 100VAC.

3.2 I/O signal connection example

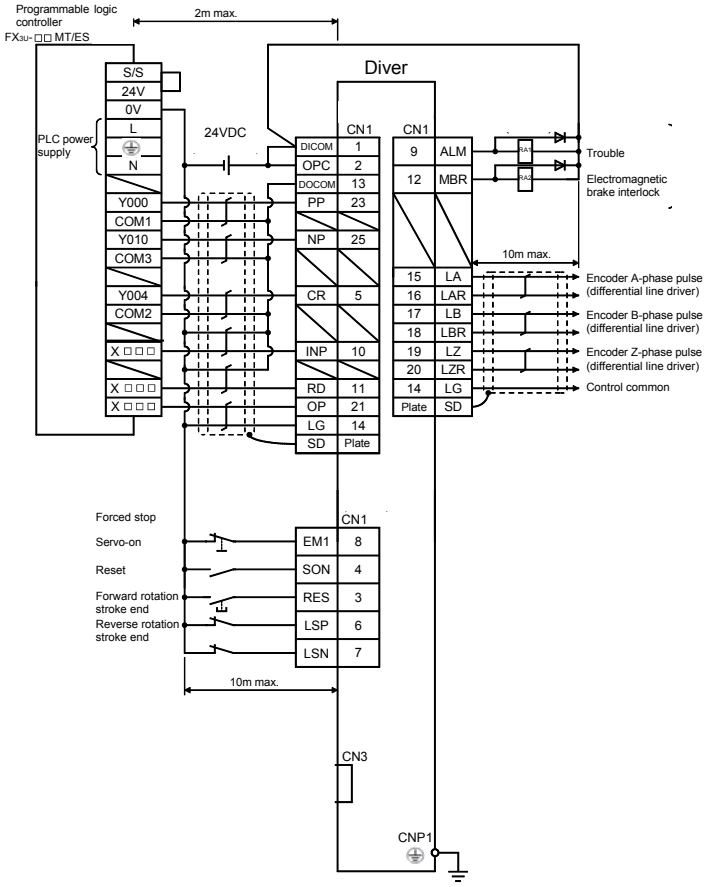
Detail of connection examples for the I/O signals of the driver.

3.2.1 Position control mode

(1) Connection example

An example of a connection for the position control mode is shown below. Connect wires as necessary.

This is a wiring example using the Mitsubishi Electric (FX3U-□□MT/ES) PLC for position control. (Connection example of the open collector system) See“LECSA Operation Manual” and the technical data disclosed the PLC and positioning unit operation manuals.



When connecting the CN1-23 pin and CN1-25 pin, supply the + 24V to OPC.

Refer to“LECSA Operation Manual”,section 3.2 for wiring details.

Refer to “LECSA Operation Manual (Simplified Edition)”,section 3.2.1 (2) and (3) for input/output signal details.

(2) Input signal

Position control mode: P, Speed control mode: S, Torque control mode: T, Point table method: CP, Program method: CL

●: Automatic ON can be set, ○: Initial setting, □: Assignment is available with parameter, −: Assignment is not available

Symbol	Device name	Automatic ON	P	S	T	CP/ CL	Function
PP	Forward rotation pulse train	-	○	-	-	-	In the open collector system (max. input frequency 200kpps) Forward rotation pulse train across PP-DOCOM Reverse rotation pulse train across NP-DOCOM
NP	Reverse rotation pulse train	-	○	-	-	-	
PG	Differential forward rotation pulse train	-	○	-	-	-	In the differential receiver system (max. input frequency 1Mpps) Forward rotation pulse train across PG-PP Reverse rotation pulse train across NG-NP
NG	Differential reverse rotation pulse train	-	○	-	-	-	
SON	Servo-on	●	○	○	○	○	Operation is available when SON is turned ON.
RES	Reset	-	○	○	○	□	Alarm can be reset.
LSP	Forward rotation stroke end	●	○	□	-	□	Turn this signal on before operation. When this signal turns off, the product is stopped suddenly and servo lock is enabled.
LSN	Reverse rotation stroke end	●	○	□	-	□	Turn this signal on before operation. When this signal turns off, the product is stopped suddenly and servo lock is enabled.
TL1	Internal torque limit selection	-	□	□	□	□	When this signal turns on, the torque will be lower than the set parameter torque.
ST1	Forward rotation start	-	-	○	-	○	Start the servo motor.
ST2	Reverse rotation start	-	-	○	-	○	Start the servo motor.
RS1	Forward rotation selection	-	-	-	○	-	Servo motor torque generating direction is selected.
RS2	Reverse rotation selection	-	-	-	○	-	Servo motor torque generating direction is selected.
SP1	Speed selection 1	-	-	○	○	-	The command rotation speed during operation is selected.
SP2	Speed selection 2	-	-	□	□	-	
SP3	Speed selection 3	-	-	□	□	-	
EM1	Forced stop	●	○	○	○	○	When this signal turns on, forced stop can be released.
CR	Clear	-	○	-	-	-	When CR is turned on, the droop pulses of the position control counter are cleared on its leading edge.
DI0	Point table No/ Program No. selection 1	●	-	-	-	○	Select point table, program and return to home position mode with DI0 to DI2.
DI1	Point table No/ Program No selection 2	●	-	-	-	○	
DI2	Point table No/ Program No selection 3	●	-	-	-	□	
MD0	Automatic/manual selection	●	-	-	-	○	When this signal turns on, automatic operation mode is activated. When this signal turns off, manual operation mode is activated.

(3) Output signal

Position control mode: P, Speed control mode: S, Torque control mode: T, Point table method: CP, Program method: CL

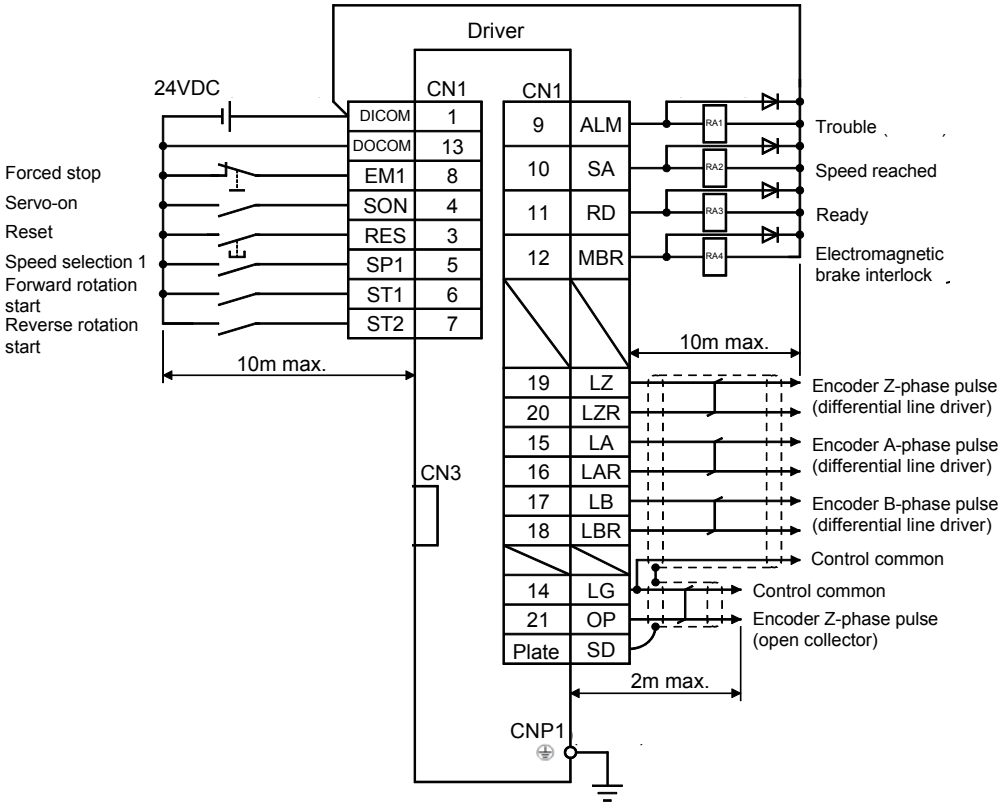
○: Initial setting, □: Assignment is available with parameter, ー: Assignment is not available

Symbol	Device name	P	S	T	CP/ CL	Function
ALM	Trouble	○	○	○	○	This signal turns off while alarm is generated.
RD	Ready	○	○	○	○	When servo-on turns on and operation is available, this signal turns on.
INP	In-position	○	-	-	○	This signal turns on when the droop pulse is within the setting range.
SA	Speed reached	-	○	-	-	When the servo motor rotation speed reaches the set speed, this signal turns on.
VLC	Limiting speed	-	-	□	-	This signal turns on when reaching the speed restricted by parameter.
TLC	Limiting torque	□	□	-	□	This signal turns on when reaching the torque set by parameter while torque is generated. .
ZSP	Zero speed	□	□	□	□	When the servo motor rotation speed is lower than the speed set by parameter, this signal turns on.
MBR	Electromagnetic brake interlock	○	○	○	○	This signal turns off in case of servo off or when alarm is generated.

3.2.2 Speed control mode

(1) Connection example

An example of a connection for the speed control mode is shown below. Connect wires as necessary.



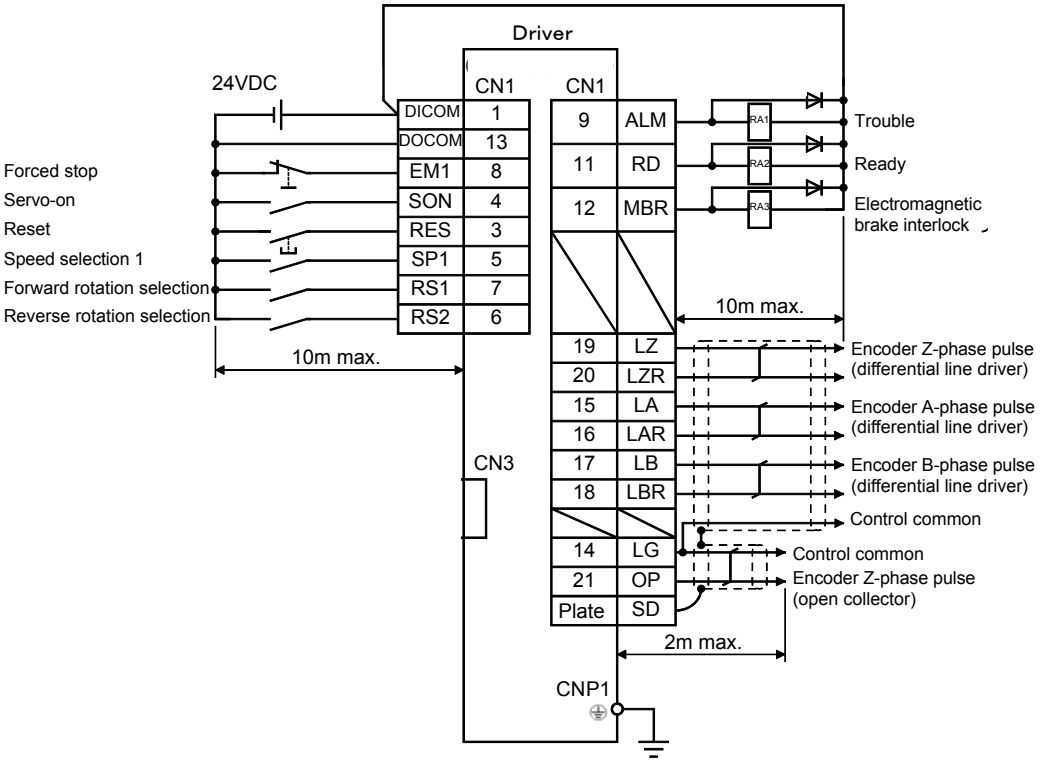
Refer to "LECSA Operation Manual",section 3.2 for wiring details.

Refer to "LECSA Operation Manual (Simplified Edition)",section 3.2.1 (2) and (3) for input/output signal details.

3.2.3 Torque control mode

(1) Wiring example

An example of a connection for the torque control mode is shown below. Connect wires as necessary.



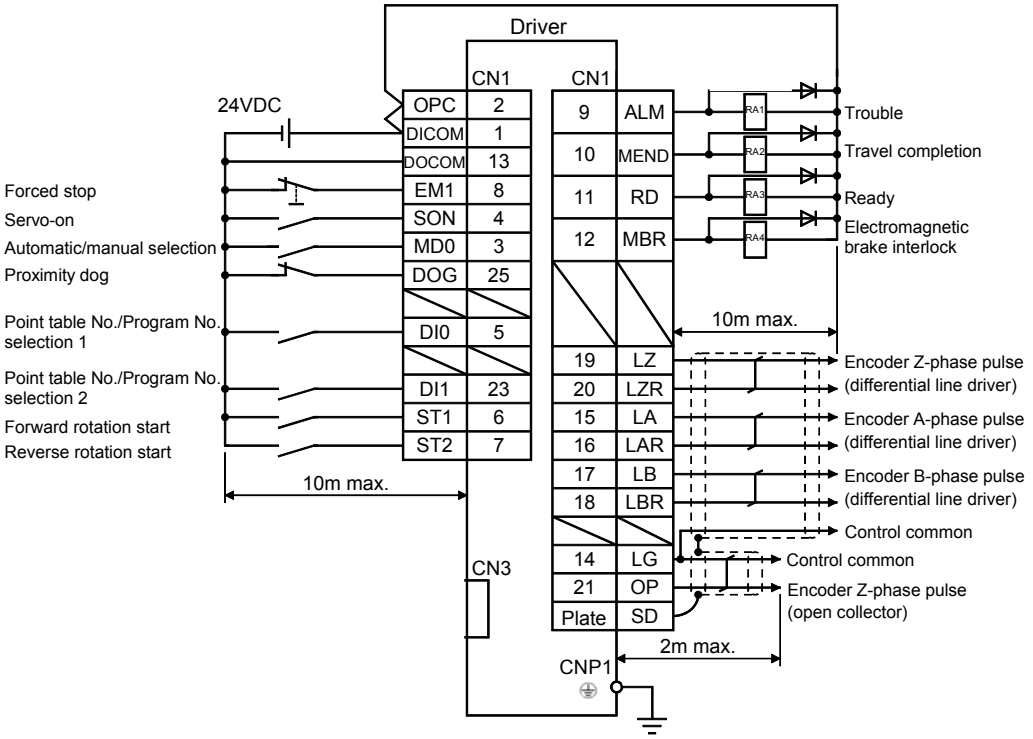
Refer to “LECSA Operation Manual”,section 3.2 for wiring details.

Refer to “LECSA Operation Manual (Simplified Edition)”,section 3.2.1 (2) and (3) for input/output signal details.

3.2.4 Positioning mode

(1) Connection example

An example of a connection for the position control mode is shown below. Connect wires as necessary.



When connecting the CN1-23 pin and CN1-25 pin, supply the + 24V to OPC.

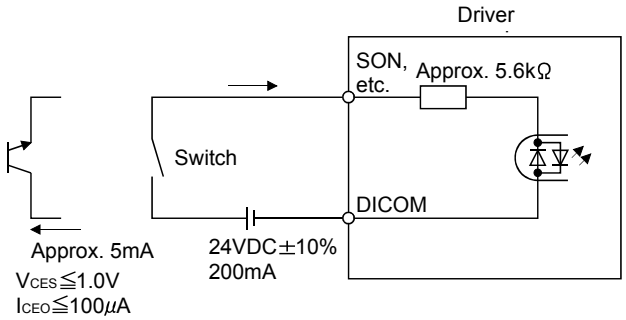
Refer to “LECSA Operation Manual”,section 3.2 for wiring details.

Refer to “LECSA Operation Manual (Simplified Edition)”,section 3.2.1 (2) and (3) for input/output signal details.

3.2.5 Source I/O interfaces

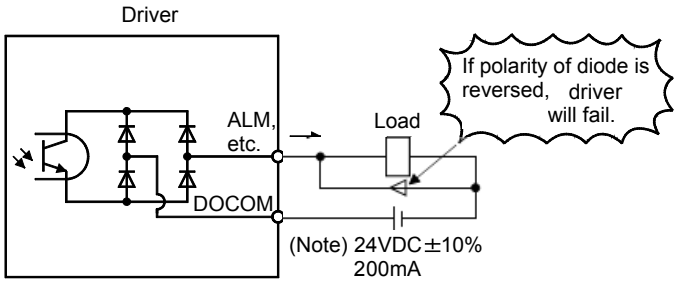
Source type I/O interfaces can be used with this driver. If used, all DI-1 input signals and DO-1 output signals are source type signals. Complete wiring according to the following interfaces.

(1) Digital input interface DI-1



(2) Digital output interface DO-1

A maximum voltage drop of 2.6V may occur in the driver.



ORIGINAL IMAGE REQUIRED

Note. If the voltage drop (2.6V max) interferes with the relay operation, apply high voltage (up to 26.4V) from external source.

4. List of Parameters for each Mode

These parameters require configuration in each control mode. Please configure parameters as required.
Refer to “LECSA Operation Manual (Simplified Edition)”,section 5.3 and “LECSA Operation Manual”,chapter 4 for details.
Refer to “LECSA Operation Manual”,chapter 4 for parameters which are not disclosed in this document.

4.1 Parameters common to each mode

(1) [Basic settings parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA01	STY	Control mode	000h	

(2) [I/O setting parameters (No. PD□□)]

These parameters are set when changing the input/output signal assignment and switching the input signal automatic on. See “LECSA Operation Manual (Simplified Edition)”,section 5.5 and “LECSA Operation Manual” section 4.4 for details.

4.2 Position control mode

(1) [Basic settings parameters (No.PA□□)]

No.	Symbol	Description	Initial value	Unit
PA05	FBP	Number of command input pulses per revolution	100	×100 pulse/rev
PA06	CMX	Electronic gear numerator (Command input pulse multiplying factor numerator)	1	
PA07	CDV	Electronic gear denominator (Command input pulse multiplying factor denominator)	1	
PA08	ATU	Auto tuning mode	001h	
PA09	RSP	Auto tuning response	6	
PA10	INP	In-position range	100	pulse
PA13	PLSS	Command input pulse form	000h	
PA14	POL	Rotation direction selection	0	

4.3 Speed control mode

(1) [Basic settings parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA08	ATU	Auto tuning mode	001h	
PA09	RSP	Auto tuning response	6	

(2) [Extension setting parameters (No. PC□□)]

No.	Symbol	Name	Initial value	Unit
PC01	STA	Acceleration time constant	0	ms
PC02	STB	Deceleration time constant	0	ms
PC05	SC0	Internal speed command 0	0	r/min
PC06	SC1	Internal speed command 1	100	r/min
PC07	SC2	Internal speed command 2	500	r/min
PC08	SC3	Internal speed command 3	1000	r/min
PC31	SC4	Internal speed command 4 [Applied]	200	r/min
PC32	SC5	Internal speed command 5 [Applied]	300	r/min
PC33	SC6	Internal speed command 6 [Applied]	500	r/min
PC34	SC7	Internal speed command 7 [Applied]	800	r/min

4.4 Torque control mode

(1) [Extension setting parameters (No. PC□□)]

No.	Symbol	Name	Default	Unit
PC01	STA	Acceleration time constant	0	ms
PC02	STB	Deceleration time constant	0	ms
PC05	SC0	Internal speed limit 0	0	r/min
PC06	SC1	Internal speed limit 1	100	r/min
PC07	SC2	Internal speed limit 2	500	r/min
PC08	SC3	Internal speed limit 3	1000	r/min
PC31	SC4	Internal speed limit 4 [Applied]	200	r/min
PC32	SC5	Internal speed limit 5 [Applied]	300	r/min
PC33	SC6	Internal speed limit 6 [Applied]	500	r/min
PC34	SC7	Internal speed limit 7 [Applied]	800	r/min

4.5 Positioning mode

(1) [Basic settings parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA05	FBP	Number of command input pulses per revolution	100	×100 pulse/rev
PA06	CMX	Electronic gear numerator (Command input pulse multiplying factor numerator)	1	
PA07	CDV	Electronic gear denominator (Command input pulse multiplying factor denominator)	1	
PA08	ATU	Auto tuning mode	001h	
PA09	RSP	Auto tuning response	6	
PA10	INP	In-position range	100	pulse
PA13	PLSS	Command input pulse form	000h	
PA14	POL	Rotation direction selection	0	

(2) [Positioning setting parameters (No. PE□□)]

No.	Symbol	Name	Initial value	Unit
PE01	CTY	Command mode selection	0000h	
PE02	FTY	Feeding function selection	0000h	
PE03	ZTY	Home position return type	0010h	
PE04	ZRF	Home position return speed	500	r/min
PE06	ZST	Home position shift distance	0	μm
PE07	FTS	Home position return/JOG operation Accelerationeration/Deceleration time constants	100	ms
PE08	ZPS	Home position return position data	0	$\times 10^{STM}$μm
PE13	JOG	JOG speed	100	r/min
PE16	LMPL	Software limit +	0	$\times 10^{STM}$μm
PE18	LMNL	Software limit -	0	$\times 10^{STM}$μm

(3) [I/O setting parameters (No. PD□□)]

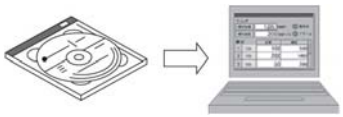
These parameters are set when changing the assignment of the input/output signal and using the point table at a maximum of 7 points.

See “LECSA Operation Manual (Simplified Edition)”,section 5.5 and “LECSA Operation Manual”,section 4.4 for details.

5. Parameter Configuration using Setup software (MR Configurator™)

This section describes the configuration procedure for main parameters using the setup software (MR Configurator™: LEC-MR-SETUP221E). See chapter 4 of the “LECSA Operation Manual” for parameter details.

5.1 PC Setup software (MR Configurator™)



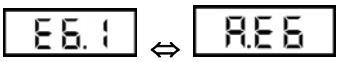
*1 Setup software version C5 or above is required.
*2 The setup software (MR Configurator™ : LEC-MR-SETUP221E)must be purchased as an additional item.
*3 The USB cable (LEC-MR-J3USB) must be purchased as an additional item.

5.1.1 Installation Method

Perform installation according to the “MR Configurator™ instruction manual” (Manual/ib0300079*.pdf) contained on the setup software (MR Configurator™) CD ROM. The “SETUP221” software will be added to the PC.

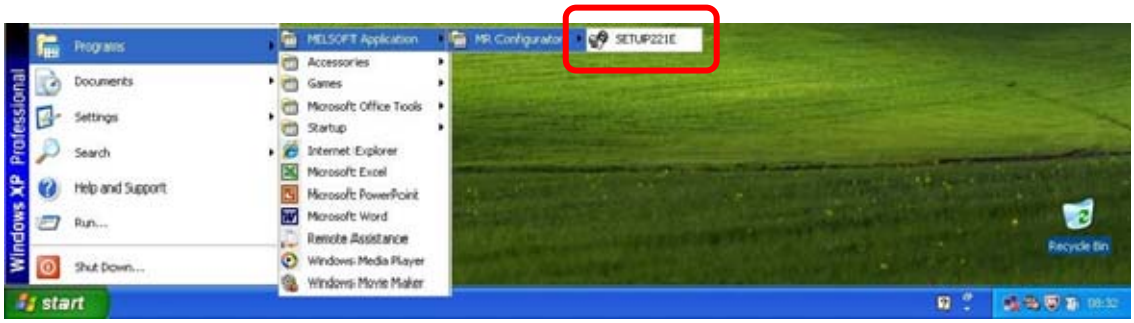
5.2 Basic driver set-up for Initial Test Drive

Switch on the 24 VDC and 230 VAC power supply to the LECSA driver and wait until the driver display flashes as shown below.

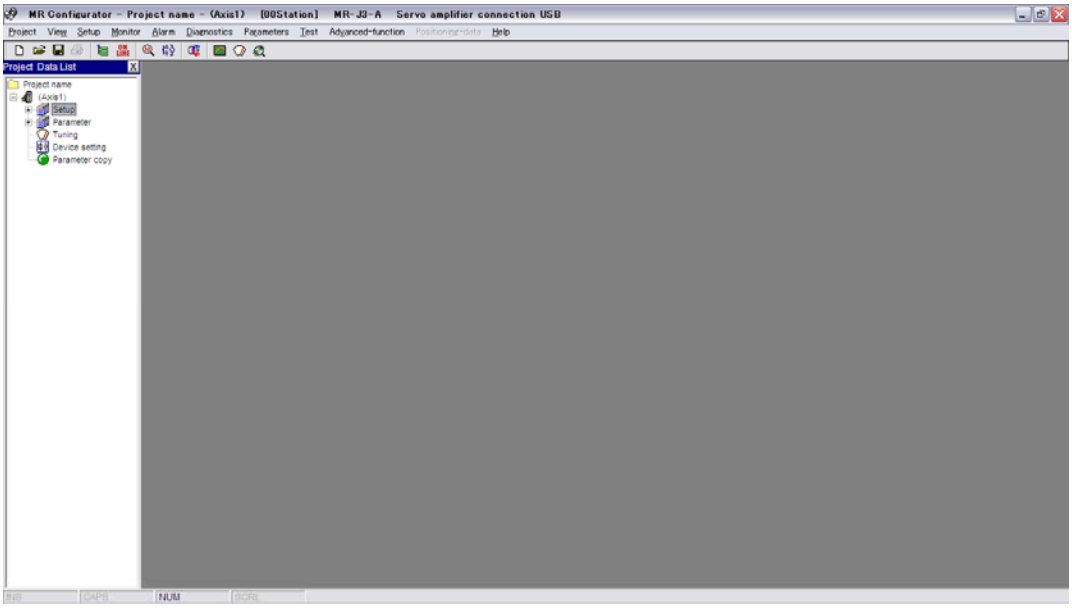


5.2.1 Start up the Setup software (MR Configurator™)

① Connect the PC and LECSA using the USB cable.
② Turn on the power of the LECSA.
③ Start application “SETUP221E”.

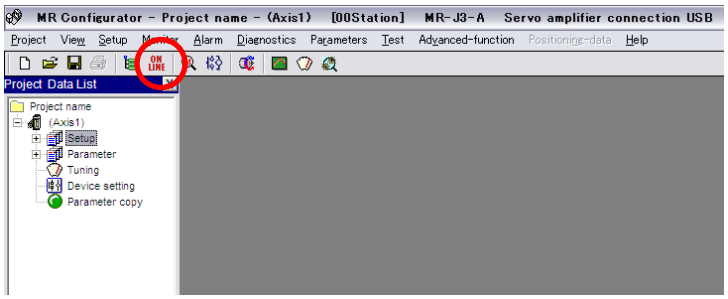


Once the application starts, the screen below will be displayed.



5.2.2 Driver ON LINE Check

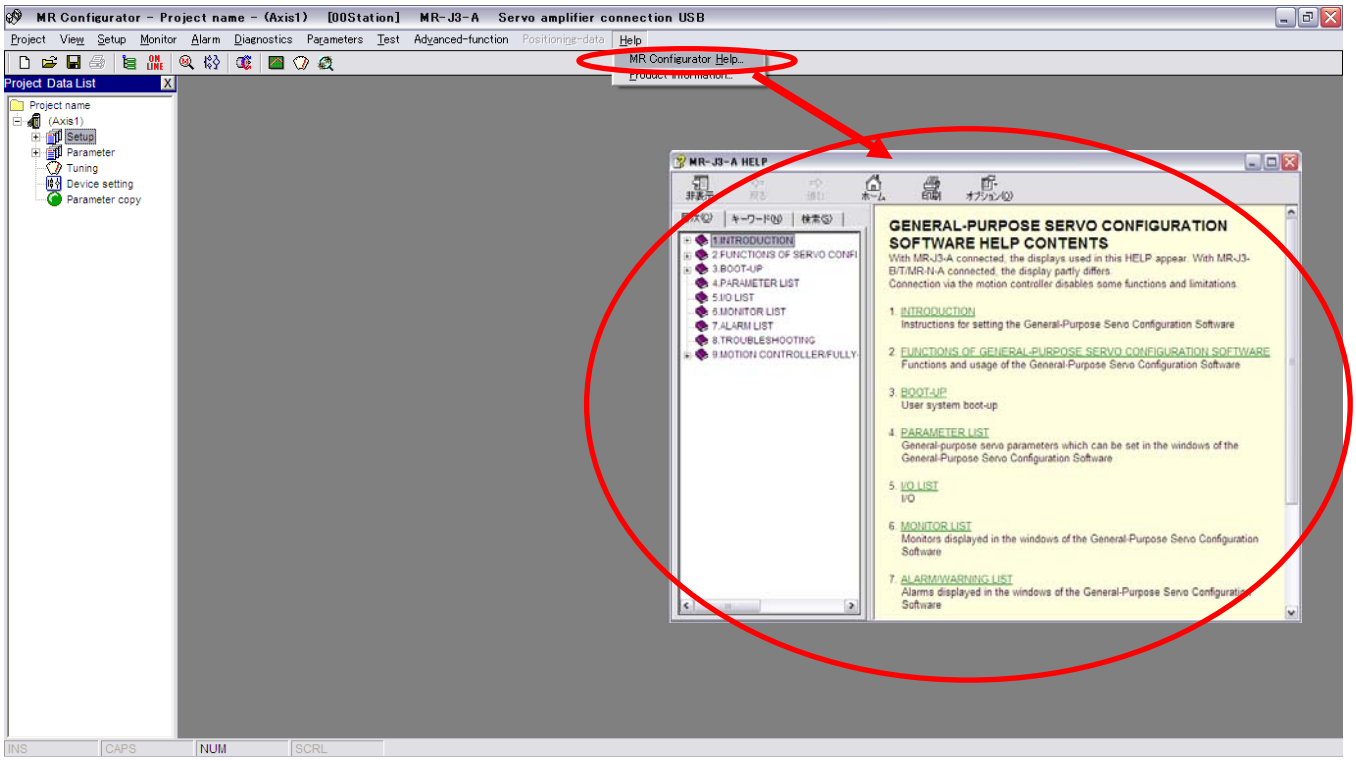
Check that the driver is enabled (ON LINE).



If the driver is not enabled, check the wiring and power supply voltage.

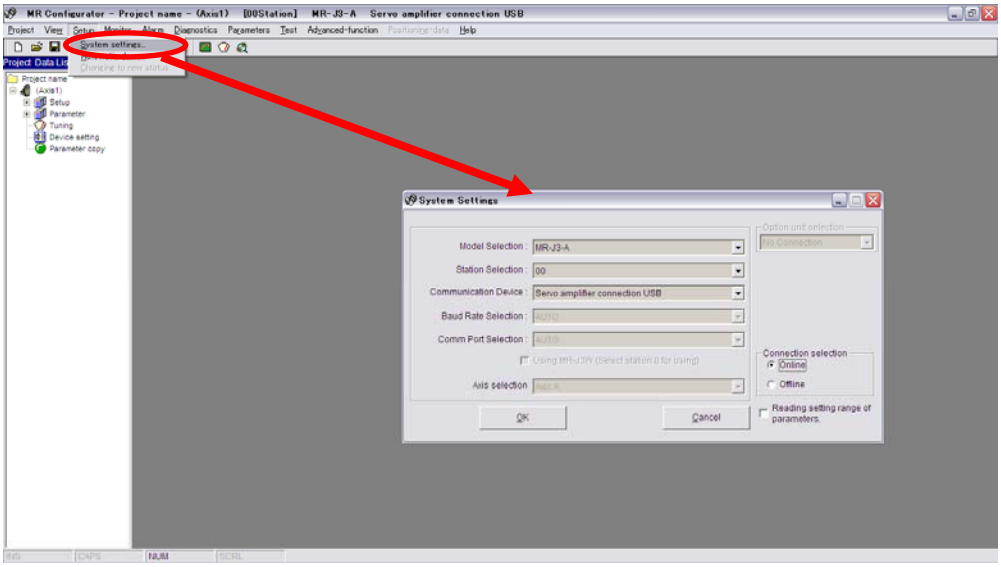
5.2.3 Help Function

By selecting “MR Configurator Help” in “Help” from any window of the setup software, a “HELP” screen will be shown as shown below.


MR Configurator - Project name - (Axis1) [00Station] MR-J3-A Servo amplifier connection USB
Project View Setup Monitor Alarm Diagnostics Parameters Test Advanced-function Positioning-data Help
MR Configurator Help...
Project Data List
Project name
(Axis1)
Setup
Parameter
Tuning
Device setting
Parameter copy
MR-J3-A HELP
1.INTRODUCTION
2.FUNCTIONS OF SERVO CONFI
3.BOOT-UP
4.PARAMETER LIST
5.I/O LIST
6.MONITOR LIST
7.ALARM LIST
8.TROUBLESHOOTING
9.MOTION CONTROLLER(FULLY
GENERAL-PURPOSE SERVO CONFIGURATION SOFTWARE HELP CONTENTS
With MR-J3-A connected, the displays used in this HELP appear. With MR-J3-B/T/MR-N-A connected, the display partly differs.
Connection via the motion controller disables some functions and limitations.
1. INTRODUCTION
Instructions for setting the General-Purpose Servo Configuration Software
2. FUNCTIONS OF GENERAL-PURPOSE SERVO CONFIGURATION SOFTWARE
Functions and usage of the General-Purpose Servo Configuration Software
3. BOOT-UP
User system boot-up
4. PARAMETER LIST
General-purpose servo parameters which can be set in the windows of the General-Purpose Servo Configuration Software
5. I/O LIST
I/O
6. MONITOR LIST
Monitors displayed in the windows of the General-Purpose Servo Configuration Software
7. ALARM/WARNING LIST
Alarms displayed in the windows of the General-Purpose Servo Configuration Software
INS
CAPS
NUM
SCRL

5.2.4 “System Settings”

① From “Setup” menu select “System Settings”, the “System Settings” window will be displayed.



5.2.5 Model Selection

① The Mitsubishi Electric Corporation series will be displayed in the model selection list.

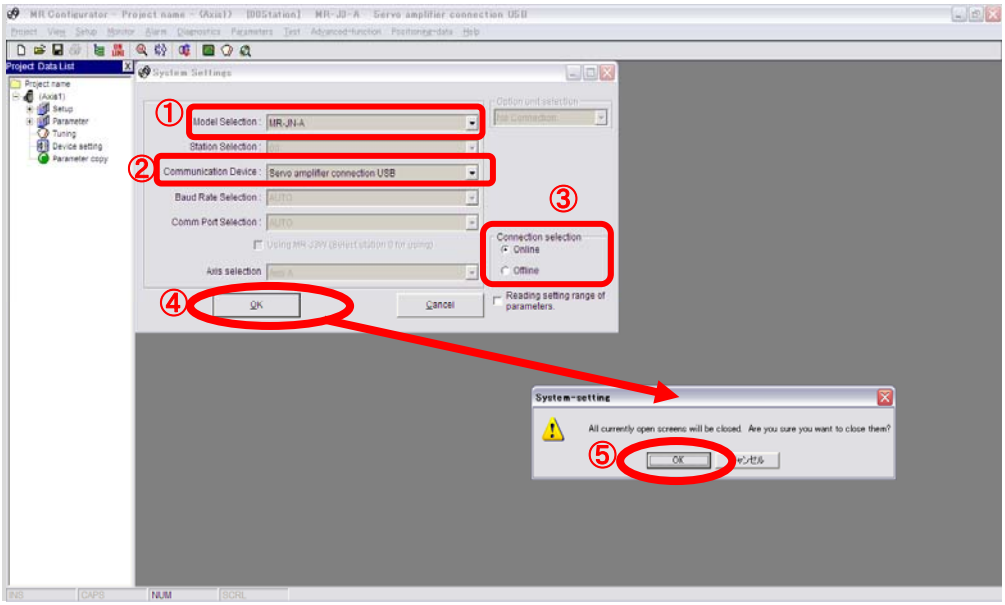
② Please select MR-JN-A if using the LECSA.

③ Please select “servo amplifier connection USB” as the communication device.

④ Select “Online” in the connection selection menu.

⑤ Click OK.

⑥ Click OK.



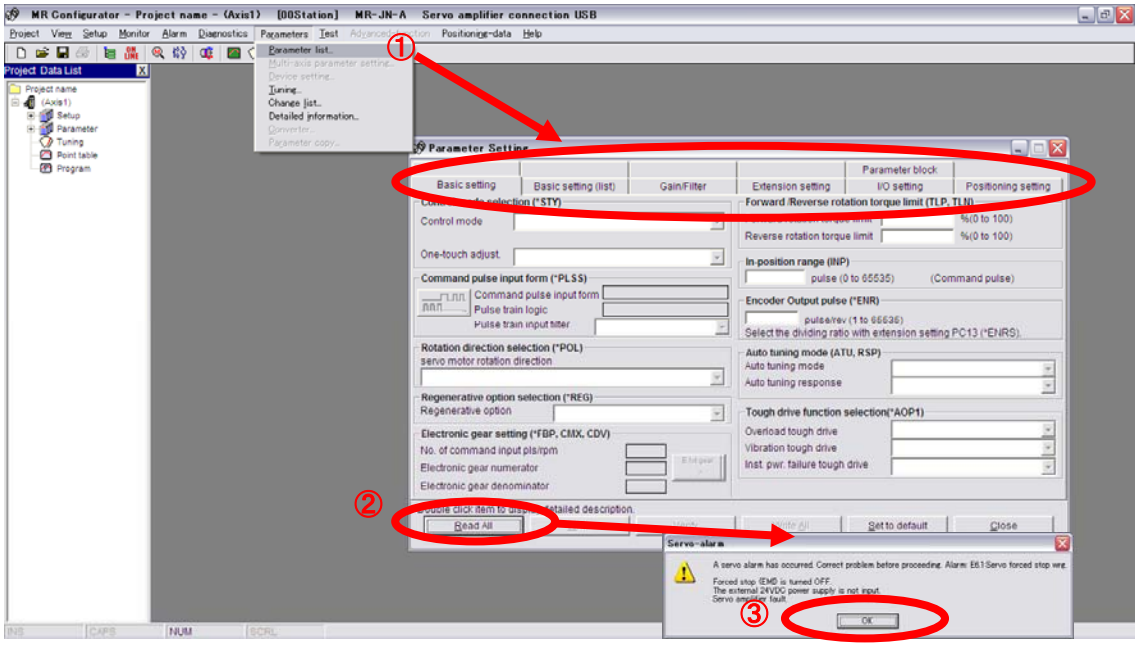
5.2.6 Parameter Upload

Upload the current parameters from the driver to the software.

① From the “Parameters” menu select “Parameter list” the “parameter setting” window will open.

② Click the “Read All” button.

③ If a Servo-alarm occurs, click “OK”.



The parameters PA, PB, PC, PD and PE can be set using the following tabs.

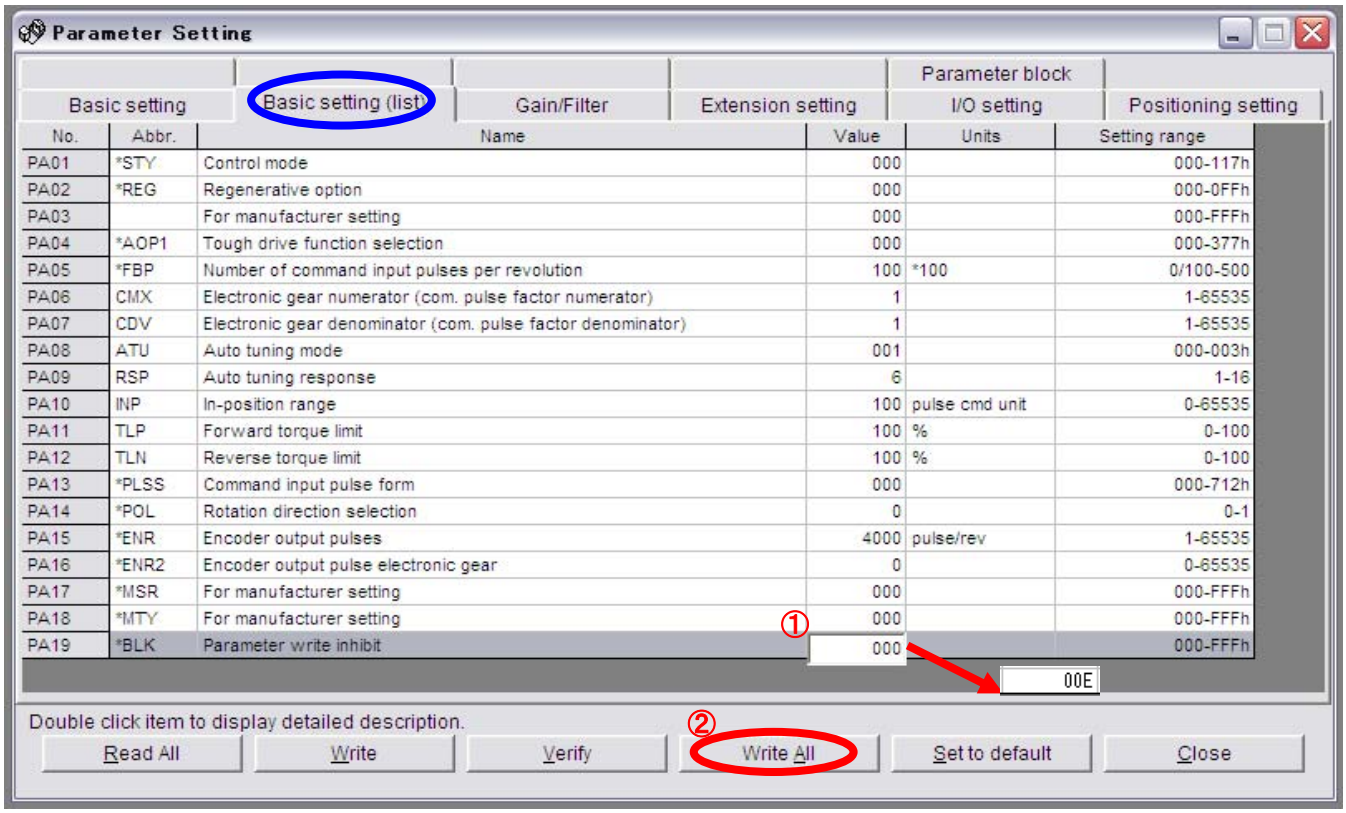
PA** : Basic settings/Basic settings (list)
PB** : Gain/Filter
PC** : Extension setting
PD** : I/O setting
PE** : Positioning setting

5.3 Parameter Settings

5.3.1 Settings to Allow Configuration of all Parameters

To enable settings for all parameters for this driver PA19 needs to be set to 00E.

① Select “Basic settings (list)” tab and change “PA19” Value to “00E”.
② Select “Write All”.
③ **Cycle the poweroff, then on for parameters for this driver to be enabled.**

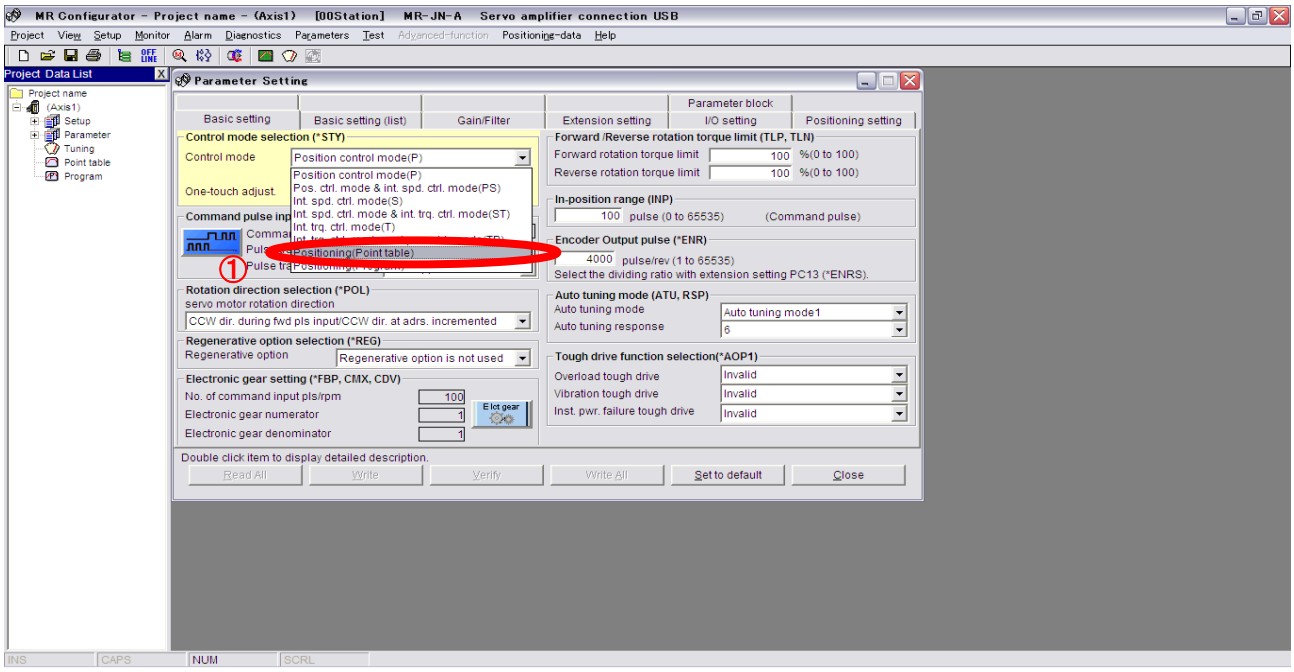

Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PA01 *STY Control mode 000 000-117h
PA02 *REG Regenerative option 000 000-0FFh
PA03 For manufacturer setting 000 000-FFFh
PA04 *AOP1 Tough drive function selection 000 000-377h
PA05 *FBP Number of command input pulses per revolution 100 *100 0/100-500
PA06 CMX Electronic gear numerator (com. pulse factor numerator) 1 1-65535
PA07 CDV Electronic gear denominator (com. pulse factor denominator) 1 1-65535
PA08 ATU Auto tuning mode 001 000-003h
PA09 RSP Auto tuning response 6 1-16
PA10 INP In-position range 100 pulse cmd unit 0-65535
PA11 TLP Forward torque limit 100 % 0-100
PA12 TLN Reverse torque limit 100 % 0-100
PA13 *PLSS Command input pulse form 000 000-712h
PA14 *POL Rotation direction selection 0 0-1
PA15 *ENR Encoder output pulses 4000 pulse/rev 1-65535
PA16 *ENR2 Encoder output pulse electronic gear 0 0-65535
PA17 *MSR For manufacturer setting 000 000-FFFh
PA18 *MTY For manufacturer setting 000 000-FFFh
PA19 *BLK Parameter write inhibit 000 000-FFFh
①
00E
Double click item to display detailed description.
②
Read All
Write
Verify
Write All
Set to default
Close

5.3.2 “Control mode selection”

When using Position control mode (pulse input)

Change the “control mode” from “Position control mode (pulse input)” to “Positioning (Point table)”.

① From the “Basic settings” tab and “Parameter Setting” window from the drop down selection “Control mode selection” select “Positioning (Point table)



When using Position control mode (pulse input)

② Parameter PA01 will change to 000 under the “Basic settings (list)” tab.

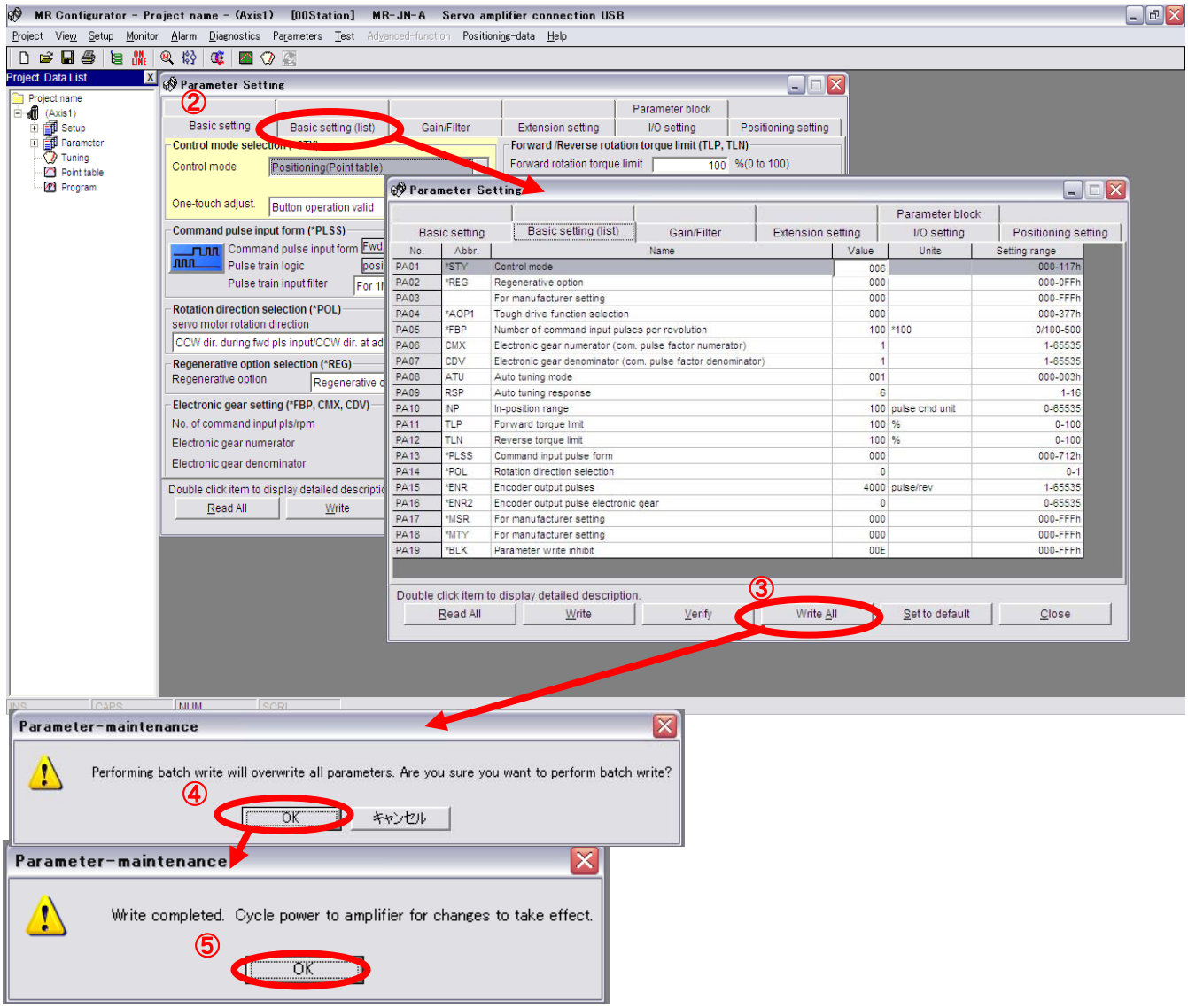
Positioning mode (point table)

② Parameter PA01 will change to 006 under the “Basic settings (list)” tab.

③ Click “Write All”.

④ Click “OK”.

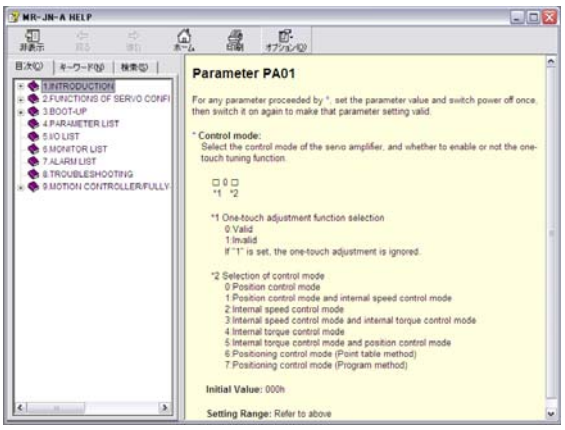
⑤ Click “OK” (Parameters will be enabled after cycling the power OFF→ON).


MR Configurator – Project name – (Axis1) [00Station] MR-JN-A Servo amplifier connection USB
Project View Setup Monitor Alarm Diagnostics Parameters Test Advanced-function Positioning-data Help
Project Data List
Project name
(Axis1)
Setup
Parameter
Tuning
Point table
Program
Parameter Setting
②
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Parameter block
Positioning setting
Control mode selection
Control mode
Positioning(Point table)
Forward /Reverse rotation torque limit (TLP, TLN)
Forward rotation torque limit
100
%(0 to 100)
One-touch adjust.
Button operation valid
Command pulse input form (*PLSS)
Command pulse input form
Pulse train logic
Pulse train input filter
Rotation direction selection (*POL)
servo motor rotation direction
CCW dir. during fwd pls input/CCW dir. at ad
Regenerative option selection (*REG)
Regenerative option
Electronic gear setting (*FBP, CMX, CDV)
No. of command input pls/rpm
Electronic gear numerator
Electronic gear denominator
Double click item to display detailed descriptio
Read All
Write
Parameter Setting
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PA01 *STY Control mode 006 000-117h
PA02 *REG Regenerative option 000 000-0FFh
PA03 For manufacturer setting 000 000-FFFh
PA04 *AOP1 Tough drive function selection 000 000-377h
PA05 *FBP Number of command input pulses per revolution 100 *100 0/100-500
PA06 CMX Electronic gear numerator (com. pulse factor numerator) 1 1-65535
PA07 CDV Electronic gear denominator (com. pulse factor denominator) 1 1-65535
PA08 ATU Auto tuning mode 001 000-003h
PA09 RSP Auto tuning response 6 1-16
PA10 INP In-position range 100 pulse cmd unit 0-65535
PA11 TLP Forward torque limit 100 % 0-100
PA12 TLN Reverse torque limit 100 % 0-100
PA13 *PLSS Command input pulse form 000 000-712h
PA14 *POL Rotation direction selection 0 0-1
PA15 *ENR Encoder output pulses 4000 pulse/rev 1-65535
PA16 *ENR2 Encoder output pulse electronic gear 0 0-65535
PA17 *MSR For manufacturer setting 000 000-FFFh
PA18 *MTY For manufacturer setting 000 000-FFFh
PA19 *BLK Parameter write inhibit 00E 000-FFFh
Double click item to display detailed description.
③
Read All
Write
Verify
Write All
Set to default
Close
Parameter-maintenance
Performing batch write will overwrite all parameters. Are you sure you want to perform batch write?
④
OK
キャンセル
Parameter-maintenance
Write completed. Cycle power to amplifier for changes to take effect.
⑤
OK

Please be aware of the following when changing parameters.

- For each parameter type, all have the feature that "parameters are enabled after the power supply is cycled after configuration" (Driver data will not come into effect until the power supply has been turned off).
- The parameter writing range to the driver differs between "Write" and "Write All".
  - ① "Write": The parameter for the applicable frame will be written to the driver.
  - ② "Write All": All parameters will be written to the driver.

Details of each parameter will be displayed in the help window when the parameter is double clicked.
(See screenshot below.)


MR-JN-A HELP
Parameter PA01
For any parameter proceeded by *, set the parameter value and switch power off once, then switch it on again to make that parameter setting valid.
* Control mode:
Select the control mode of the servo amplifier, and whether to enable or not the one-touch tuning function.
*1 One-touch adjustment function selection
0:Valid
1:Invalid
If "1" is set, the one-touch adjustment is ignored.
*2 Selection of control mode
0:Position control mode
1:Position control mode and internal speed control mode
2:Internal speed control mode
3:Internal speed control mode and internal torque control mode
4:Internal torque control mode
5:Internal torque control mode and position control mode
6:Positioning control mode (Point table method)
7:Positioning control mode (Program method)
Initial Value: 000h
Setting Range: Refer to above

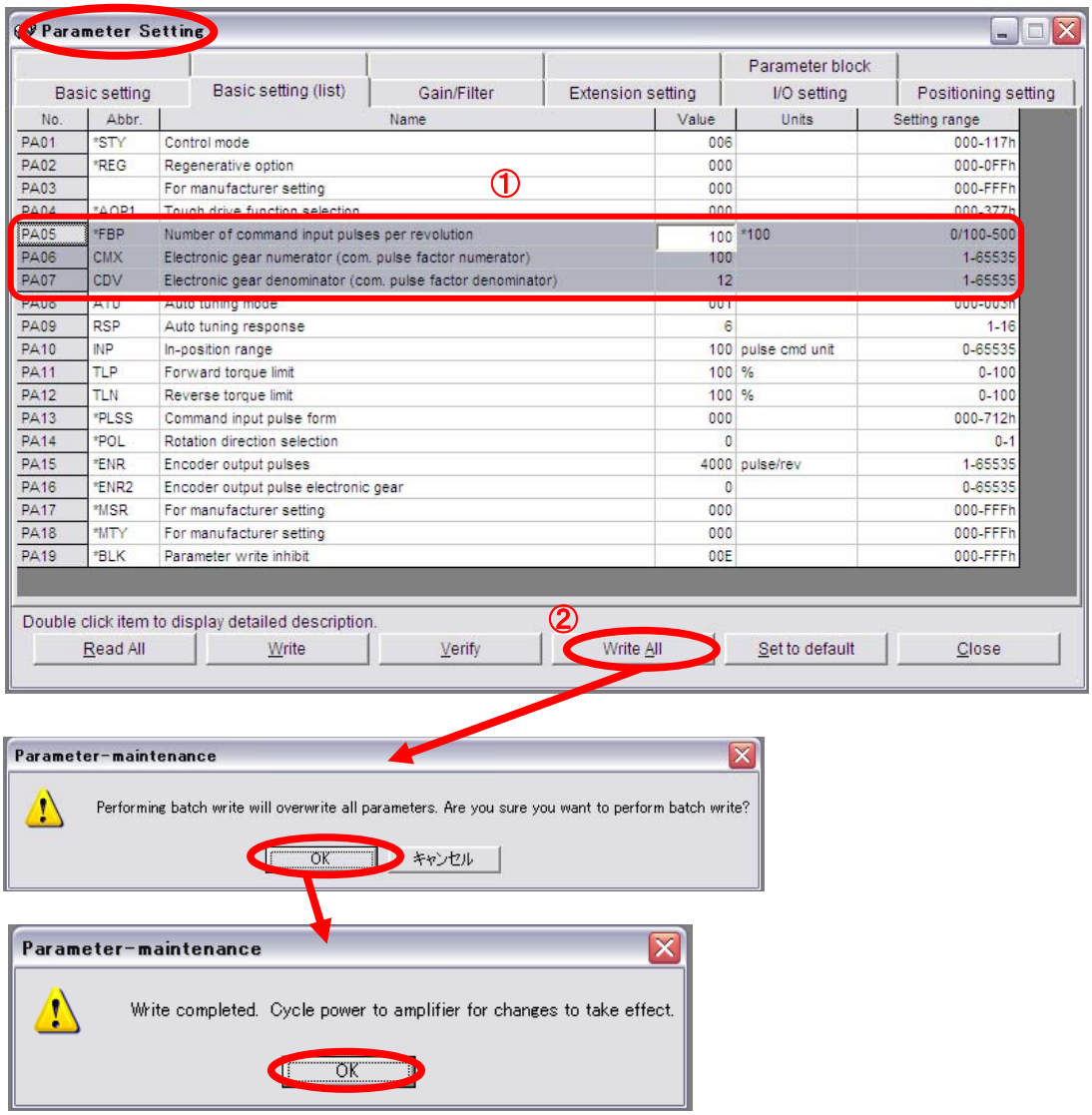
5.3.3 Parameter Configuration Method

Set the parameters for applicable actuator.

Refer to “LECSA Operation Manual (Simplified Edition)”,section 5.4.3 for recommended parameter values for SMC supplied actuators.
However, when using position control mode (pulse input), do not alter parameters PE02/PE03/PE04/PE07/PE08/ PE10/PE11 from their initial values (Only change these parameters for Positioning mode (point table/program method)).

PA05/PA06/PA07 Configuration Examples

① Parameters PA05/PA06/PA07 are configured under the “Basic settings (list)” tab.
② Select “Write All”.
③ **Cycle the power off to on. The parameters will now be active.**


Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PA01 *STY Control mode 006 000-117h
PA02 *REG Regenerative option 000 000-0FFh
PA03 For manufacturer setting 000 000-FFFh
PA05 *FBP Number of command input pulses per revolution 100 *100 0/100-500
PA06 CMX Electronic gear numerator (com. pulse factor numerator) 100 1-65535
PA07 CDV Electronic gear denominator (com. pulse factor denominator) 12 1-65535
PA09 RSP Auto tuning response 6 1-16
PA10 INP In-position range 100 pulse cmd unit 0-65535
PA11 TLP Forward torque limit 100 % 0-100
PA12 TLN Reverse torque limit 100 % 0-100
PA13 *PLSS Command input pulse form 000 000-712h
PA14 *POL Rotation direction selection 0 0-1
PA15 *ENR Encoder output pulses 4000 pulse/rev 1-65535
PA16 *ENR2 Encoder output pulse electronic gear 0 0-65535
PA17 *MSR For manufacturer setting 000 000-FFFh
PA18 *MTY For manufacturer setting 000 000-FFFh
PA19 *BLK Parameter write inhibit 00E 000-FFFh
①
②
Double click item to display detailed description.
Read All
Write
Verify
Write All
Set to default
Close
Parameter-maintenance
Performing batch write will overwrite all parameters. Are you sure you want to perform batch write?
OK
キャンセル
Parameter-maintenance
Write completed. Cycle power to amplifier for changes to take effect.
OK

5.3.4 Recommended Parameter Values by Actuator Model

Please change the parameter values according to the customer application. See section 4 of the "LECSA Operation Manual" for details.

Recommended Parameter Values [LEF]

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter	Para No	Initial value	Recommended Value								
Number of command input pulses per revolution *3.	PA05	100	**100**								
Electronic gear numerator *3.	PA06	1	**100 (Positioning mode: 10)**								
Electronic gear denominator *3.	PA07	1	**20**	**12**	**6**	**24**	**16**	**8**	**30**	**20**	**10**
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000 ((<1000 stroke)/0001 (>1000 stroke)**								
Home position return type	PE03	0010	**□□□3 (Stopper type)**								
Home position return direction	PE03	0010	□□1□ (Motor side)								
Home position return Speed (rpm)	PE04	500	**90**	**150**	**300**	**75**	**113**	**225**	**60**	**90**	**180**
Home position return/JOG operation Accelerationeration/Deceleration time constants (msec)	PE07	100	**1000**	**600**	**300**	**1200**	**800**	**400**	**1500**	**1000**	**500**
Home position return position data (μm)	PE08	0	**-2000 (<1000 stroke)/-200 (>1000 stroke)**								
Stopper type home position return stopper time (msec)	PE10	100	**200**								
Stopper type home position return torque limit value (%)	PE11	15	**30**								
Regenerative option	PA02	000	**000 (Non)/002 (LEC-MR-RB-032)**								
Rotation direction selection *4	PA14	0	**1 (+:Counter motors side)**								
Adaptive tuning mode	PB01	000	000								
★Load to motor inertia moment ratio	PB06	7	**50**								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	000	000								

★ Parameter setting required.

Differs to initial value

*1. Parameter is set to the recommended value. Please set parameter according to customer application.

*2. Mechanical resonance may occur depending on the shape or mounting orientation of the work piece. Please change this parameter during initial configuration.
(Parameter initial configuration ⇒ Set the recommended parameter value ⇒ Operation start)

*3. Other than positioning mode: Actuator travel distance at 10 [μm/pulse] per pulse.
Positioning Mode: Minimum actuator travel distance of 1[μm].

*4. When the motor mounting position is right side parallel (LEFS*R) or left side parallel (LEFS*L), the rotation direction selection is 0(+: Counter motors side).

Series			LEFB25	LEFB25U	LEFB32	LEFB32U	LEFB40	LEFB40U
	Lead symbol		S					
	Lead		54					
Parameter	Para No	Initial value	Recommended value					
Number of command input pulses per revolution *3.	PA05	100	**100**					
Electronic gear numerator *3.	PA06	1	**100 (Positioning mode: 10)**					
Electronic gear denominator *3.	PA07	1	**54**					
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000 (<1000 stroke)/0001 (>1000 stroke)**					
Home position return type	PE03	0010	**□□□3 (Stopper type)**					
Home position return direction	PE03	0010	□□1□ (Motor side)					
Home position return Speed (rpm)	PE04	500	**66**					
Home position return/JOG operation Accelerationeration/Deceleration time constants (msec)	PE07	100	**2700**					
Home position return position data (μm)	PE08	0	**-3000 (<1000 stroke)/-300 (>1000 stroke)**					
Stopper type home position return stopper time (msec)	PE10	100	**200**					
Stopper type home position return torque limit value (%)	PE11	15	**30**					
Regenerative option	PA02	000	**000 (Non)/002 (LEC-MR-RB-032)**					
Rotation direction selection	PA14	0	**1 (+: Counter motors side)**	0 (+: Counter motors side)	**1 (+: Counter motors side)**	0 (+: Counter motors side)	**1 (+: Counter motors side)**	0 (+: Counter motors side)
★ Adaptive tuning mode	PB01	000	**002**		000			
★ Load to motor inertia moment ratio	PB06	7	**50**					
★ Machine resonance suppression filter 1	PB13	4500	**400**		4500			
★ Notch shape selection 1	PB14	000	**030**		000			

★ Parameter setting required.

Differs to initial value

*1. Parameter is set to the recommended value. Please set parameter according to customer application.

*2. Mechanical resonance may occur depending on the shape or mounting orientation of the work piece. Please change this parameter during initial configuration.
(Parameter initial configuration ⇒ Set the recommended parameter value ⇒ Operation start)

*3. Other than positioning mode: Actuator travel distance at 10 [μm/pulse] per pulse.
Positioning Mode: Minimum actuator travel distance of 1[μm].

Recommended Parameter Values [LEJ]

Series			LEJS40			LEJS63			LEJB40	LEJB63
	Lead symbol		H	A	B	H	A	B	T	
	Lead		24	16	8	30	20	10	27	42
Parameter	Para. No	Initial value	Recommended value							
Number of command input pulses per revolution *3.	PA05	100	**100**							
Electronic gear numerator *3.	PA06	1	**100 (Positioning mode: 10)**							
Electronic gear denominator *3.	PA07	1	**24**	**16**	**8**	**30**	**20**	**10**	**27**	**42**
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000 (<1000 stroke)/0001 (>1000 stroke)**							
Home position return type	PE03	0010	**□□□3 (Stopper type)**							
Home position return direction	PE03	0010	□□1□ (Motor side)							
Home position return Speed (rpm)	PE04	500	**75**	**113**	**225**	**60**	**90**	**180**	**133**	**86**
Home position return/JOG operation Accelerationeration/Deceleration time constants (msec)	PE07	100	**1200**	**800**	**400**	**1500**	**1000**	**500**	**1350**	**2100**
Home position return position data (μm)	PE08	0	**-2000 (<1000 stroke)/-200 (>1000 stroke)**							
Stopper type home position return stopper time (msec)	PE10	100	**200**							
Stopper type home position return torque limit value (%)	PE11	15	**30**							
Regenerative option	PA02	000	**000 (Non)/002 (LEC-MR-RB-032)/003 (LEC-MR-RB-12)**							
Rotation direction selection	PA14	0	**1 (+:Counter motors side)**						0 (+:Counter motors side)	
★Adaptive tuning mode	PB01	000	000						**002**	000
★Load to motor inertia moment ratio	PB06	7	7						**50**	
★Machine resonance suppression filter 1	PB13	4500	4500						**400**	4500
★Notch shape selection 1	PB14	000	000						**030**	000

★ Parameter setting required.
Differs to initial value

*1. Parameter is set to the recommended value. Please set parameter according to customer application.
*2. Mechanical resonance may occur depending on the shape or mounting orientation of the work piece. Please change this parameter during initial configuration.
(Parameter initial configuration ⇒ Set the recommended parameter value ⇒ Operation start)
*3. Other than positioning mode: Actuator travel distance at 10 [μm/pulse] per pulse.
Positioning Mode: Minimum actuator travel distance of 1[μm].

Recommended Parameter Values [LEY]

Series			LEY25/LEYG25			LEY25D/LEYG25D			LEY32/LEYG32			LEY32D/LEYG32D		
	Lead symbol		A	B	C	A	B	C	A	B	C	A	B	C
	Lead		12	6	3	12	6	3	20	10	5	16	8	4
Parameter	Para. No	Initial value	Recommended value											
Number of command input pulses per revolution *3.	PA05	100	**100**											
Electronic gear numerator *3.	PA06	1	**100 (Positioning mode: 10)**											
Electronic gear denominator *3.	PA07	1	**12**	**6**	**3**	**12**	**6**	**3**	**20**	**10**	**5**	**16**	**8**	**4**
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000 (<1000 stroke)/0001 (>1000 stroke)**											
Home position return type	PE03	0010	**□□□3 (Stopper type)**											
Home position return direction	PE03	0010	□□1□ (Motor side)											
Home position return Speed (rpm)	PE04	500	**50**	**100**	**200**	**50**	**100**	**200**	**30**	**60**	**120**	**38**	**75**	**150**
Home position return/JOG operation Accelerationeration/Deceleration time constants (msec)	PE07	100	**600**	**300**	**150**	**600**	**300**	**150**	**1000**	**500**	**250**	**800**	**400**	**200**
Home position return position data (μm)	PE08	0	**-2000 (<1000 stroke)/-200 (>1000 stroke)**											
Stopper type home position return stopper time (msec)	PE10	100	**200**											
Stopper type home position return torque limit value (%)	PE11	15	**30**											
Regenerative option	PA02	000	**000 (Non)/002 (LEC-MR-RB-032)**											
Rotation direction selection	PA14	0	0 (+:Counter motors side)			**1 (+:Counter motors side)**			0 (+:Counter motors side)			**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	000	000											
Load to motor inertia moment ratio	PB06	7	7											
Machine resonance suppression filter 1	PB13	4500	4500											
Notch shape selection 1	PB14	000	000											

Differs to initial value

*1. Parameter is set to the recommended value. Please set parameter according to customer application.

*2. Mechanical resonance may occur depending on the shape or mounting orientation of the work piece. Please change this parameter during initial configuration.
(Parameter initial configuration ⇒ Set the recommended parameter value ⇒ Operation start)

*3. Other than positioning mode: Actuator travel distance at 10 [μm/pulse] per pulse.
Positioning Mode: Minimum actuator travel distance of 1[μm].

Series			LEY63				LEY63D		
	Lead symbol		A	B	C	L	A	B	C
	Lead		20	10	5	2.86	20	10	5
Parameter	Para. No	Initial value	Recommended value						
Number of command input pulses per revolution *3.	PA05	100	**100**						
Electronic gear numerator *3.	PA06	1	**100 (10)**			**35 (7)**	**100 (10)**		
Electronic gear denominator *3.	PA07	1	**20**	**10**	**5**	**1 (2)**	**20**	**10**	**5**
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000 (<1000 stroke)/0001 (>1000 stroke)**						
Home position return type	PE03	0010	**□□□3 (Stopper type)**						
Home position return direction	PE03	0010	□□1□ (Motor side)						
Home position return Speed (rpm)	PE04	500	**30**	**60**	**120**	**210**	**30**	**60**	**120**
Home position return/JOG operation Accelerationeration/Deceleration time constants (msec)	PE07	100	**1000**	**500**	**250**	**143**	**1000**	**500**	**250**
Home position return position data (μm)	PE08	0	**-4000 (<1000 stroke)/-400 (>1000 stroke)**						
Stopper type home position return stopper time (msec)	PE10	100	**200**						
Stopper type home position return torque limit value (%)	PE11	15	**30**						
Regenerative option	PA02	000	**000 (Non)/002 (LEC-MR-RB-032)/003 (LEC-MR-RB-12)**						
Rotation direction selection	PA14	0	0 (+:Counter motors side)				**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	000	000						
Load to motor inertia moment ratio	PB06	7	7						
Machine resonance suppression filter 1	PB13	4500	4500						
Notch shape selection 1	PB14	000	000						

Differs to initial value

*1. Parameter is set to the recommended value. Please set parameter according to customer application.

*2. Mechanical resonance may occur depending on the shape or mounting orientation of the work piece. Please change this parameter during initial configuration.
(Parameter initial configuration ⇒ Set the recommended parameter value ⇒ Operation start)

*3. Other than positioning mode: Actuator travel distance at 10 [μm/pulse] per pulse.
Positioning Mode: Minimum actuator travel distance of 1[μm].

5.3.5 Position control mode (pulse input)

It is required to set the command input pulse form dependent on the upper unit pulse train when using the Position control mode (pulse input).

・Input form (3 types)

① Forward rotaion pulse train/Reverse rotaion pulse train
② Pulse train/ Directionphase pulse train/B-phase pulse train
③ A-phase pulse train/ B-phase pulse train

・Logic (2 types)

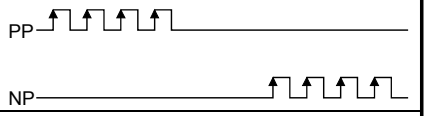
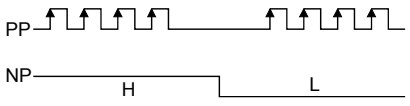
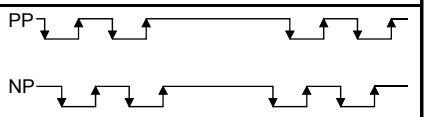
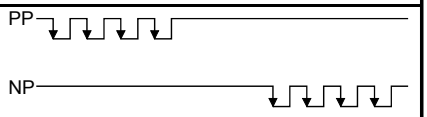
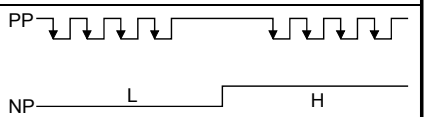
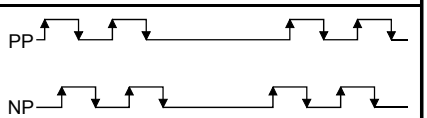
① Positive logic
② Negative logic

・Input form (3 pulse types) × positive/negative logic (2 types) = 6 selectable types

In the upper level device (positioning module), there is a parameter which sets the output pulse form (mode). The form of the upper level device (positioning module) must be made “compatable” with the LECSA. If the forms are not compatable, the operation work correctly. Please be aware that depending on the upper level device (positioning module), the “command input pulse forms” above may not be available.

Parameter No. PA13

Selection of command input pulse form

Setting	Pulse train form		Forward rotation command	Reverse rotation command
00	Positive logic	Forward rotation pulse train Reverse rotation pulse train		
01		Signed pulse train		
02		A-phase pulse train B-phase pulse train		
10	Negative logic	Forward rotation pulse train Reverse rotation pulse train		
11		Signed pulse train		
12		A-phase pulse train B-phase pulse train		

Pulse train input filter selection

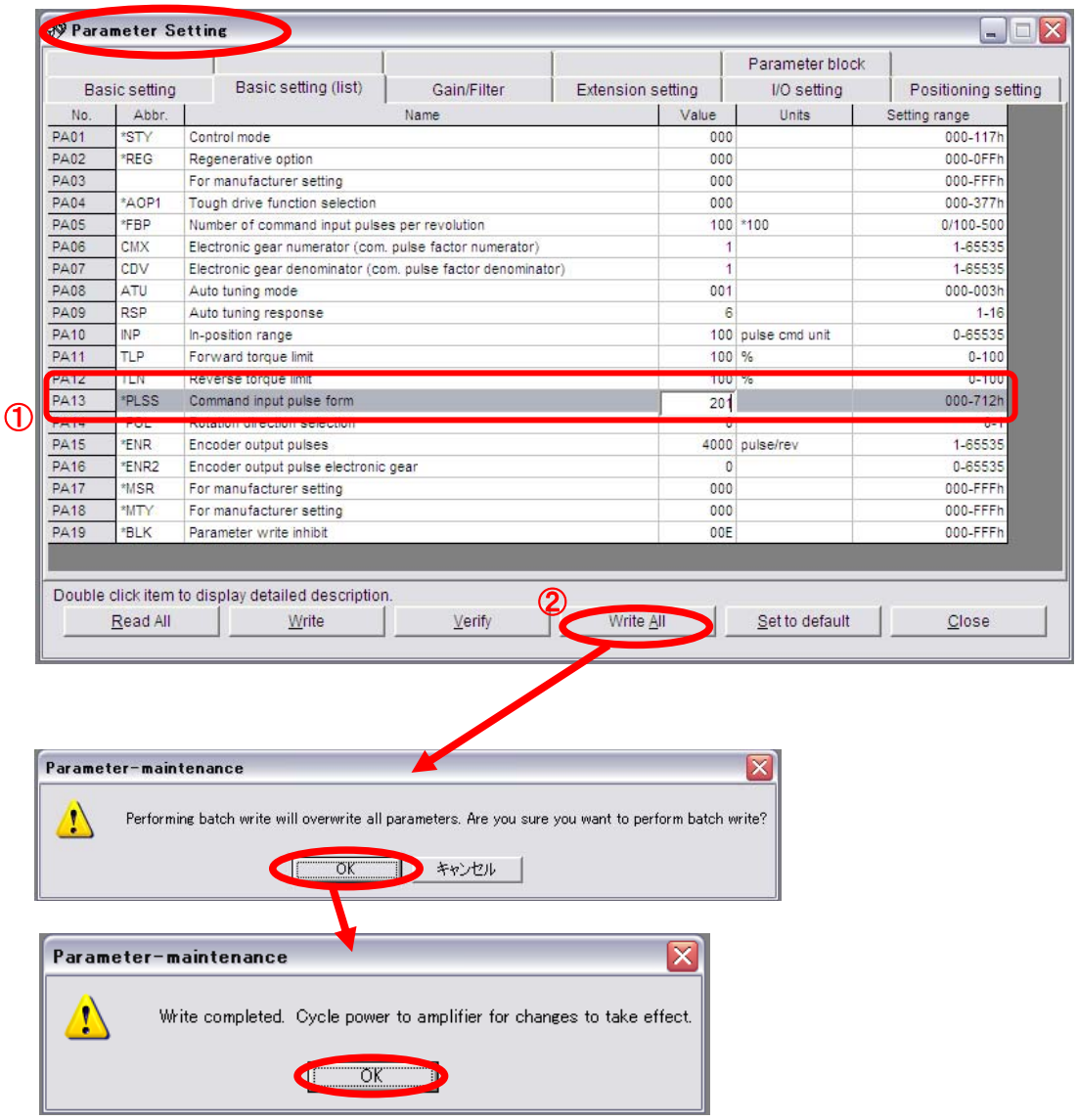
Setting	Command pulse frequency
0	1Mpps or less
1	500kpps or less
2	200kpps or less

Ex.) Setting of Command input Pulse form, when:
(1) The command pulse frequency is 200kpps or less and
(2) The pulse train form is set to positive logic, with the NP signal high and low
[PA13] = 201

① Change PA13 in the Basic settings list tab to 201.

② Click “Write All”.

③ **<u>Cycle the power off, then on for the Parameters to be activated.</u>**


Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PA01 *STY Control mode 000 000-117h
PA02 *REG Regenerative option 000 000-0FFh
PA03 For manufacturer setting 000 000-FFFh
PA04 *AOP1 Tough drive function selection 000 000-377h
PA05 *FBP Number of command input pulses per revolution 100 *100 0/100-500
PA06 CMX Electronic gear numerator (com. pulse factor numerator) 1 1-65535
PA07 CDV Electronic gear denominator (com. pulse factor denominator) 1 1-65535
PA08 ATU Auto tuning mode 001 000-003h
PA09 RSP Auto tuning response 6 1-16
PA10 INP In-position range 100 pulse cmd unit 0-65535
PA11 TLP Forward torque limit 100 % 0-100
PA13 *PLSS Command input pulse form 201 000-712h
PA15 *ENR Encoder output pulses 4000 pulse/rev 1-65535
PA16 *ENR2 Encoder output pulse electronic gear 0 0-65535
PA17 *MSR For manufacturer setting 000 000-FFFh
PA18 *MTY For manufacturer setting 000 000-FFFh
PA19 *BLK Parameter write inhibit 00E 000-FFFh
①
Double click item to display detailed description.
Read All
Write
Verify
②
Write All
Set to default
Close
Parameter-maintenance
Performing batch write will overwrite all parameters. Are you sure you want to perform batch write?
OK
キャンセル
Parameter-maintenance
Write completed. Cycle power to amplifier for changes to take effect.
OK

5.3.6 Electronic Gears

It is necessary to adjust the electric gear to convert from the command pulse sent from position unit to the travel amount of electrical actuator.

See “LECSA Operation Manual (Simplified Edition)”,section 5.3.4 for the recommended values for electronic gears for each actuator model.

Please configure the electronic gear values according to the customer application.

(1) LECSA Parameter Configuration: [PA05], [PA06] and [PA07]

Parameter			Initial value	Setting range	Unit	Control mode			
No.	Symbol	Name				Position	Internal speed	Internal torque	Positioning
PA05	*FBP	Number of command input pulses per revolution	100	0・100 to 500	× 100 pulse/rev	○			○
PA06	CMX	Electronic gear numerator (Command pulse multiplying factor numerator)	1	1 to 65535		○			○
PA07	CDV	Electronic gear denominator (Command pulse multiplying factor denominator)	1	1 to 65535		○			○

(1) Complete configuration as shown below.

*[PA05] = 100 (Initial value)
The initial value of 100 corresponds to the "Nomber of command input pulses per revolution" of 10000 [pulses/rev].

* [PA06] = [PA05]×100×P× $\frac{1}{1000}$

* [PA07] = Actuator lead (L) [mm]

P: Travel amount per 1 command pulse [μm]*

Ex.)

Travel amount per 1 command pulse (P=10μm)
Actuator lead (L = 6mm)

[PA05] = 100 (Initial value)

[PA06]=100×100×10× $\frac{1}{1000}$
=100×100×0.01
=100

[PA07]=6 (Actuator lead (L) [mm])

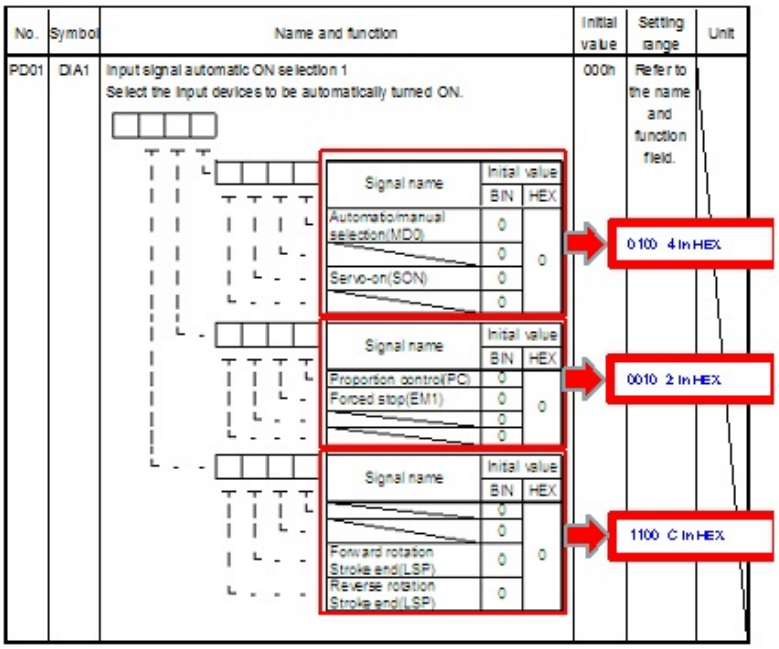
*In case position control mode, "Travel amount per 1 command pulse"P = 10[um]
*In case positioning mode, "Travel amount per 1 command pulse"P = 1[um]

5.3.7 Automatic Input Signal ON Selection Parameter Configuration

Configure the input signal automatic ON selection parameter.
The parameter “PD01 : Input signal automatic ON selection” settings, defines which input signals will turn ON automatically when the control circuit power supplyis turned on., doing this allows additional I/O signal selection range.
Please allocate it according to your system specification.

Configure the automatic ON selection in parameter [PD01], or configure the I/O signal layout. If I/O signal wiring layout is altered, do not configure PD01 : Input signal automatic ON selection.
***If all I/O signals are controlled, please set PD01 to 0000.**

Please configure PD01 : Input signal automatic ON selection in Hexadecimal (HEX).



Binary number -> Decimal / Hexadecimal

Binary number				Decimal	Hexadecimal
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	5	5
0	1	1	0	6	6
0	1	1	1	7	7
1	0	0	0	8	8
1	0	0	1	9	9
1	0	1	0	10	A
1	0	1	1	11	B
1	1	0	0	12	C
1	1	0	1	13	D
1	1	1	0	14	E
1	1	1	1	15	F

During Actuator Operation: <Signals which must be ON during actuator operation>

Set PD01 as 0C24. The following signals will automatically turn on when power supply turns on.

SON	Servo-on	**OFF : Servo-off** **ON : Servo-on (operational)**
LSP	Forward rotaion Stroke end (normally closed contact)	**OFF : Forward rotaion Stroke end** **ON : Forward rotaion Stroke end off (operational)**
LSN	Reverse rotaion Stroke end (normally closed contact)	**OFF : Reverse rotaion Stroke end** **ON : Reverse rotaion Stroke end off (operational)**
EM1	Forced stop (normally closed contact)	**OFF : Forced stop** **ON : Forced stop off (operational)**

In positioning mode (point table), congifure the operation mode using automatic/manual selection **MD0.**
The MD0 off selection will allow Jog operation and it will require an input reserved for MD0.

For Automatic MD0 please set PD01 as 0C25. Will also include MD0 automatic ON.

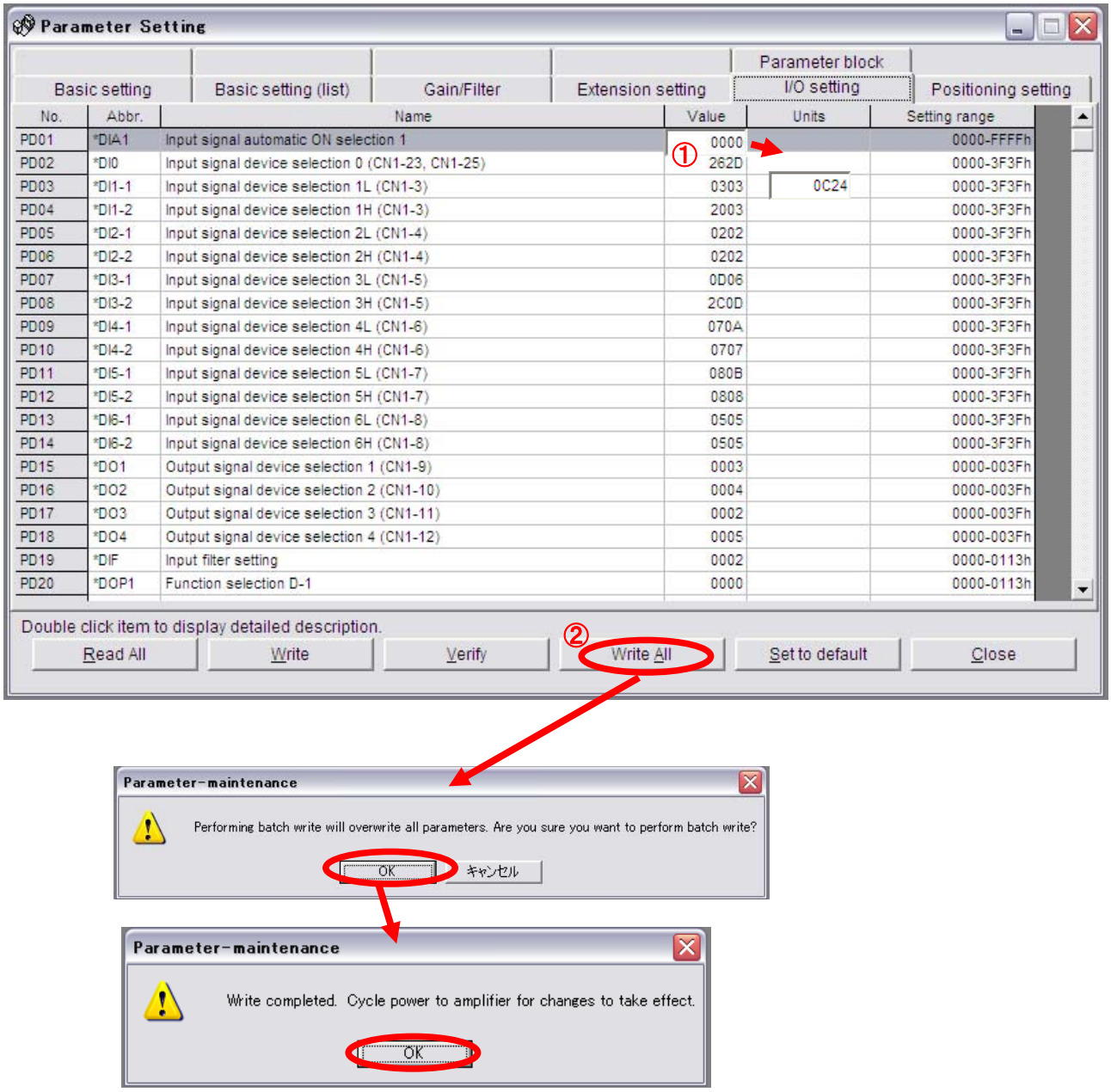
MD0	Automatic/manual selection	**ON: Automatic Operation Mode** → Home position return/positioning mode operation available.

* Enabling “Stroke end” (LSP, LSN) , “Forced stop” (EM1) and “Servo-on” (SON) Signals

① Set to PD01 to 0C24 in the I/O setting tab.

② Select “Write All”.

③ **Cycle the power off, then for thechanged Parameters to be enabled.**


Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PD01 *DIA1 Input signal automatic ON selection 1 0000 0000-FFFFh
PD02 *DI0 Input signal device selection 0 (CN1-23, CN1-25) 262D 0000-3F3Fh
PD03 *DI1-1 Input signal device selection 1L (CN1-3) 0303 0C24 0000-3F3Fh
PD04 *DI1-2 Input signal device selection 1H (CN1-3) 2003 0000-3F3Fh
PD05 *DI2-1 Input signal device selection 2L (CN1-4) 0202 0000-3F3Fh
PD06 *DI2-2 Input signal device selection 2H (CN1-4) 0202 0000-3F3Fh
PD07 *DI3-1 Input signal device selection 3L (CN1-5) 0D06 0000-3F3Fh
PD08 *DI3-2 Input signal device selection 3H (CN1-5) 2C0D 0000-3F3Fh
PD09 *DI4-1 Input signal device selection 4L (CN1-6) 070A 0000-3F3Fh
PD10 *DI4-2 Input signal device selection 4H (CN1-6) 0707 0000-3F3Fh
PD11 *DI5-1 Input signal device selection 5L (CN1-7) 080B 0000-3F3Fh
PD12 *DI5-2 Input signal device selection 5H (CN1-7) 0808 0000-3F3Fh
PD13 *DI6-1 Input signal device selection 6L (CN1-8) 0505 0000-3F3Fh
PD14 *DI6-2 Input signal device selection 6H (CN1-8) 0505 0000-3F3Fh
PD15 *DO1 Output signal device selection 1 (CN1-9) 0003 0000-003Fh
PD16 *DO2 Output signal device selection 2 (CN1-10) 0004 0000-003Fh
PD17 *DO3 Output signal device selection 3 (CN1-11) 0002 0000-003Fh
PD18 *DO4 Output signal device selection 4 (CN1-12) 0005 0000-003Fh
PD19 *DIF Input filter setting 0002 0000-0113h
PD20 *DOP1 Function selection D-1 0000 0000-0113h
①
Double click item to display detailed description.
Read All
Write
Verify
②
Write All
Set to default
Close
Parameter-maintenance
Performing batch write will overwrite all parameters. Are you sure you want to perform batch write?
OK
キャンセル
Parameter-maintenance
Write completed. Cycle power to amplifier for changes to take effect.
OK

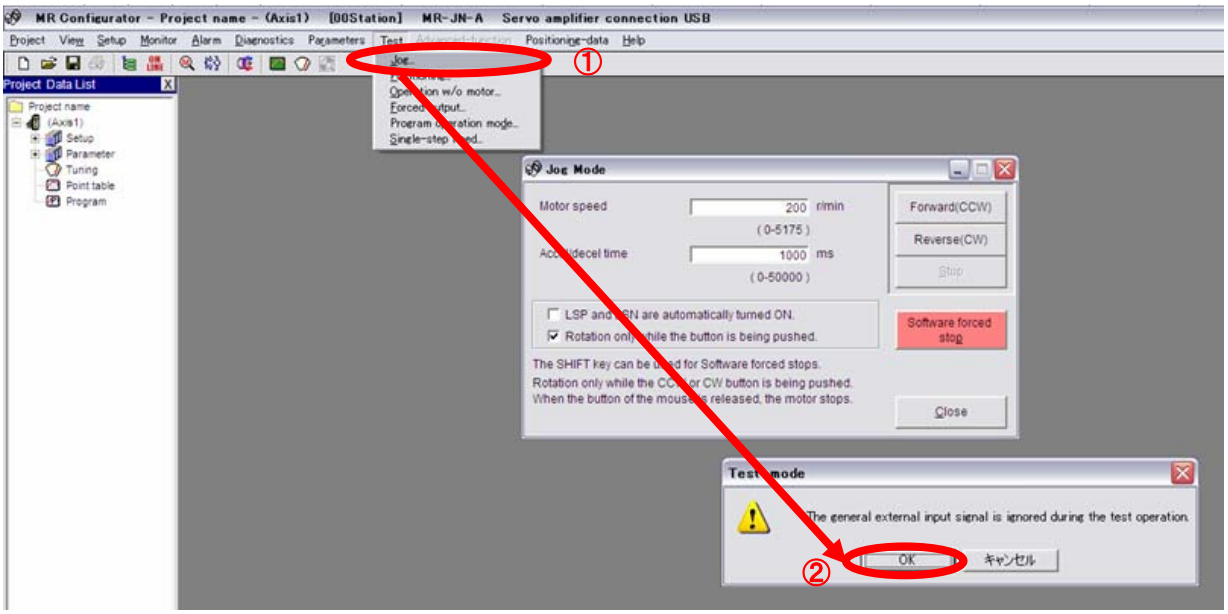
* In this configuration, the stroke end **(LSP, LSN)**, forced stop **(EM1)** and servo-on **(SON)** signals will be ON automatically when the power is turned ON.

5.4 JOG Mode in the Setup Software

① The “JOG Mode” window can be displayed by selecting “Jog” from the “Test” menu in the **setup software**.

② Click “OK”.

(When using this function, all external input signal operation will be diabled. If controlling using a PLC or other upper device, please turn off the power and reset the device before use.)

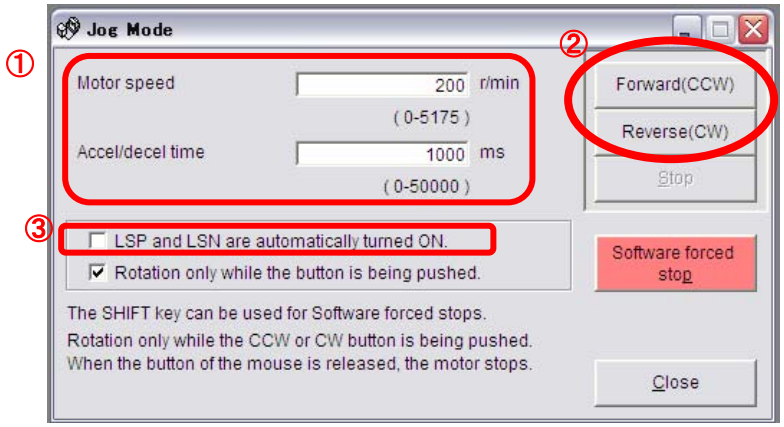


5.4.1 JOG Mode

① In order to prevent accidental impact at the end of the stroke, test actuator operation at low speed.
See “LECSA Operation Manual (Simplified Edition)”,section 5.6.2 for motor speed configuration.
See “LECSA Operation Manual (Simplified Edition)”,section 5.6.3 for Acceleration/deceleration time.

② Check actuator JOG operation using [Forward (CCW)] and [Reverse (CW)] in JOG mode. (if operation is not correct, please check wiring and parameters). When performing JOG operation in the setup software, the rotation direction of the actuator does not change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves in the direction of [Forward (CCW)] button and [Reverse (CW)] button.

③ If the selection “LSP and LSN are automatically turned ON” is not checked, an alarm will occur (if checked, the stroke end signals (LSP & LSN) will be automatically turned ON when this window is open).



Item	Setting range	Unit	Description
Motorspeed	0 ~ allowable actuator speed	r/min	Set the command speed of the servo motor for execution of positioning (**motor rotations/minute**).
Acceleration/deceleration time	0 ~ 50000	ms	Set the time until the servo motor reaches/stops to the rated speed (3000 r/min).

5.5 Changing I/O Signal Allocation

Input/output signal assignment can be changed as appropriate from initial settings. There may be cases when changes to the Input/output signal assignment are required for actuator operation.
Please be aware that any changes will alter signals entered as initial settings.
Please allocate it according to your system specification.
*When configuring PD**, please set parameter write inhibit [PA19] to 00E.
See “LECSA Operation Manual”,section 4.4 for details.
Set parameters related to I/O: [PD02] to [PD18]

PD02 to PD14 Input signal assignment (CN1-23, CN1-25, CN1-3 to CN1-8)
PD15 to PD18 Output signal assignment (CN1-9 to CN1-12)

5.5.1 Initial I/O Signal Allocation

(1) Position control mode (pulse input):

The initial (Default) allocation of I/O signals is shown below.

Input signal points (6): (position control mode) and initial assignment

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Reset	RES	CN1-3	DI-1	PD03	0303
Servo-on	SON	CN1-4	DI-1	PD05	0202
Clear	CR	CN1-5	DI-1	PD07	0D06
Forward rotation stroke end	LSP	CN1-6	DI-1	PD09	070A
Reverse rotation stroke end	LSN	CN1-7	DI-1	PD11	080B
Forced stop	EM1	CN1-8	DI-1	PD13	0505

Output signal points (4) (position control mode) and initial assignment

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Trouble	ALM	CN1-9	DO-1	PD15	0003
In-position	INP	CN1-10	DO-1	PD16	0004
Ready	RD	CN1-11	DO-1	PD17	0002
Electromagnetic brake interlock	MBR	CN1-12	DO-1	PD18	0005

See “LECSA Operation Manual”,section 3.5 and “LECSA Operation Manual”,section 3.6 for details regarding signals.
See “LECSA Operation Manual”,section 4.4.2 for parameter configuration values.

※ Pins CN1-23 and CN1-25 are pulse input terminals. These cannot be allocated as any other input signals.

※ Pins CN1-3 - CN1-8 (input signals) and CN1-9 - CN1-12 (output signals) can be allocated as current SYNC (NPN) interface and current SOURCE (PNP) interface wiring and I/O signal allocation.

(2) Positioning mode:

The initial allocation of the I/O signals is shown below.

Input signal points (8): (positioning mode) and initial assignment

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Forced stop	EM1	CN1-8	DI-1	PD14	0505
Proximity dog	DOG	CN1-25	DI-1	PD02	262D
Servo-on	SON	CN1-4	DI-1	PD06	0202
Automatic /manual selection	MD0	CN1-3	DI-1	PD04	2003
Forward rotation start	ST1	CN1-6	DI-1	PD10	0707
Reverse rotation start	ST2	CN1-7	DI-1	PD12	0808
Point table No. /Program No. selection 1	DI0	CN1-5	DI-1	PD08	2C0D
Point table No. /Program No. selection 2	DI1	CN1-23	DI-1	PD02	262D

Output signal points (4): (positioning mode) and initial assignment

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Trouble	ALM	CN1-9	DO-1	PD15	0003
In-position	INP	CN1-10	DO-1	PD16	0004
Ready	RD	CN1-11	DO-1	PD17	0002
Electromagnetic brake interlock	MBR	CN1-12	DO-1	PD18	0005

See “LECSA Operation Manual”,section 13.2.3 for details regarding signals.
See “LECSA Operation Manual”,section 4.4.2 for details on parameter setting values.

※ Pins CN1-23 and CN1-25 can be allocated in current SYNC (NPN) interface interface wiring and I/O signal allocation only.

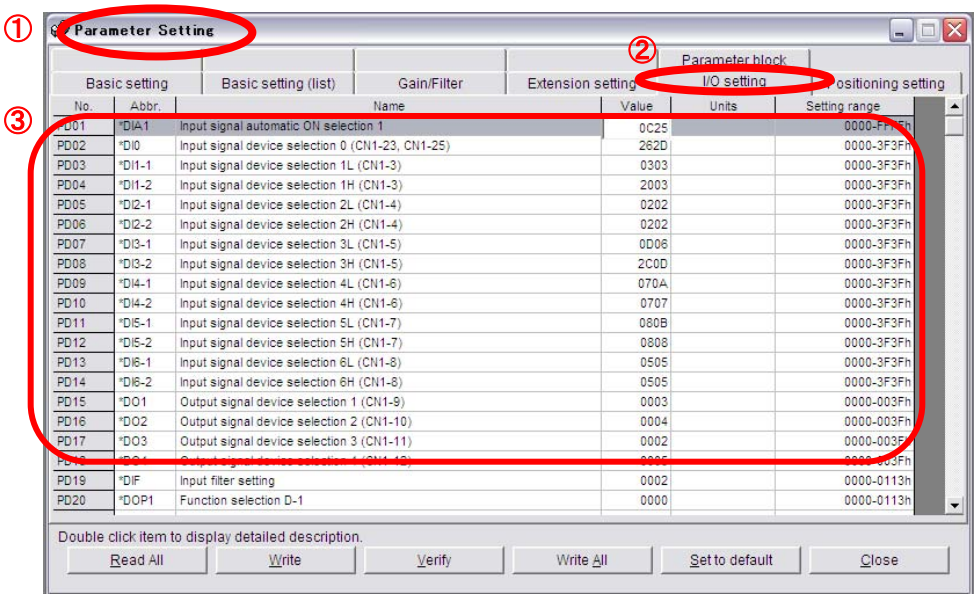
※ Pins CN1-3 and CN1-8 (input signals) and CN1-9 ~ CN1-12 (output signals) can be allocated in currect SYNC (NPN) interface and current SOURCE (PNP) interface wiring and I/O signal allocation.

5.5.2 Signal Allocation using Setup Software

① The “Parameter Setting” window will be displayed when “parameter list” is selected from the “parameters” menu in the setup software.

② Click the I/O setting tab.

③ When changing the allocation of signals, parameters for “PD02” - “PD18” can be altered.


①
Parameter Setting
②
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
③
No. Abbr. Name Value Units Setting range
PD01 *DIA1 Input signal automatic ON selection 1 0C25 0000-FFFFh
PD02 *DI0 Input signal device selection 0 (CN1-23, CN1-25) 262D 0000-3F3Fh
PD03 *DI1-1 Input signal device selection 1L (CN1-3) 0303 0000-3F3Fh
PD04 *DI1-2 Input signal device selection 1H (CN1-3) 2003 0000-3F3Fh
PD05 *DI2-1 Input signal device selection 2L (CN1-4) 0202 0000-3F3Fh
PD06 *DI2-2 Input signal device selection 2H (CN1-4) 0202 0000-3F3Fh
PD07 *DI3-1 Input signal device selection 3L (CN1-5) 0D06 0000-3F3Fh
PD08 *DI3-2 Input signal device selection 3H (CN1-5) 2C0D 0000-3F3Fh
PD09 *DI4-1 Input signal device selection 4L (CN1-6) 070A 0000-3F3Fh
PD10 *DI4-2 Input signal device selection 4H (CN1-6) 0707 0000-3F3Fh
PD11 *DI5-1 Input signal device selection 5L (CN1-7) 080B 0000-3F3Fh
PD12 *DI5-2 Input signal device selection 5H (CN1-7) 0808 0000-3F3Fh
PD13 *DI6-1 Input signal device selection 6L (CN1-8) 0505 0000-3F3Fh
PD14 *DI6-2 Input signal device selection 6H (CN1-8) 0505 0000-3F3Fh
PD15 *DO1 Output signal device selection 1 (CN1-9) 0003 0000-003Fh
PD16 *DO2 Output signal device selection 2 (CN1-10) 0004 0000-003Fh
PD17 *DO3 Output signal device selection 3 (CN1-11) 0002 0000-003Fh
PD19 *DIF Input filter setting 0002 0000-0113h
PD20 *DOP1 Function selection D-1 0000 0000-0113h
Double click item to display detailed description.
Read All
Write
Verify
Write All
Set to default
Close

5.5.3 Allocation Examples for Position Control Mode (Pulse Input)

(1) Example of Gain switch (CDP) Settings

When changing pin CN1-4 from Servo-on (SON) to Gain switch (CDP).

	Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
	Reset	RES	CN1-3	DI-1	PD03	0303
①	Servo-on	SON	CN1-4	DI-1	PD05	0202
	Clear	CR	CN1-5	DI-1	PD07	0D06
	Forward rotation stroke end	LSP	CN1-6	DI-1	PD09	070A
	Reverse rotation stroke end	LSN	CN1-7	DI-1	PD11	080B
	Forced stop	EM1	CN1-8	DI-1	PD13	0505

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Reset	RES	CN1-3	DI-1	PD03	0303
Gain changing	CDP	CN1-4	DI-1	PD05	0202→0211
Clear	CR	CN1-5	DI-1	PD07	0D06
Forward rotation stroke end	LSP	CN1-6	DI-1	PD09	070A
Reverse rotation stroke end	LSN	CN1-7	DI-1	PD11	080B
Forced stop	EM1	CN1-8	DI-1	PD13	0505

① Changing PD05 from 0202 to 02**11**

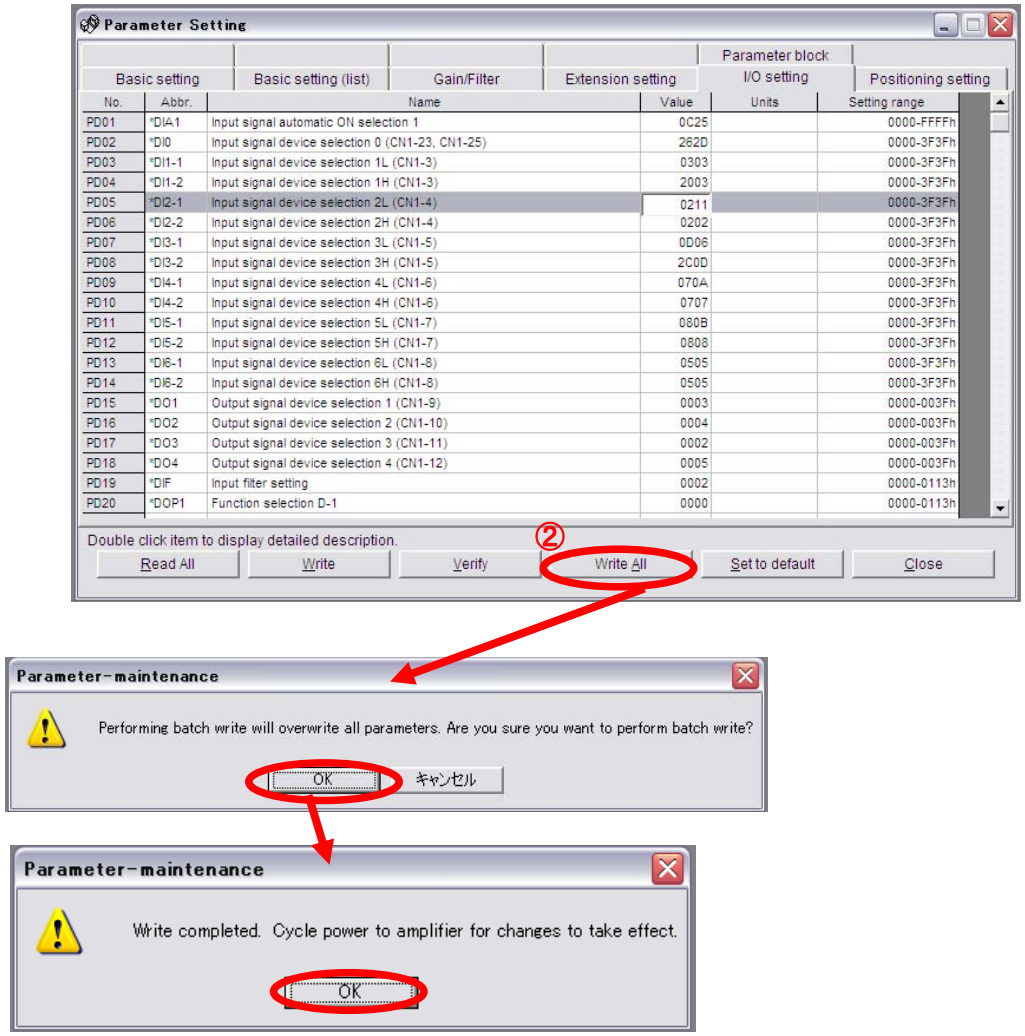
PD05	*DI2-1	Input signal device selection 2L (CN1-4) Any input signal can be assigned to the CN1-4 pin. The devices that can be assigned and the setting method are the same as in parameter No. PD03. 11 Position control mode Internal speed control mode Select the input device of the CN1-4 pin.

Setting	Control modes (Note 1)			
	P	S	T	CP/CL
00				
01	For manufacturer setting (Note 2)			
02	SON	SON	SON	SON
03	RES	RES	RES	RES
04	PC	PC		PC
05 (Note4)	EM1	EM1	EM1	EM1
06	CR			
07		ST1	RS2	ST1
08		ST2	RS1	ST2
09	TL1	TL1		TL1
0A	LSP	LSP		LSP
0B	LSN	LSN		LSN
0C	For manufacturer setting (Note 2)			
0D		SP1	SP1	
0E		SP2	SP2	
0F		SP3	SP3	
10	LOP	LOP	LOP	
11	CDP	CDP		CDP
12 to 1F	For manufacturer setting (Note 2)			
20				MD0
21 to 23				For manufacturer setting (Note 2)
24				TSTP
25				For manufacturer setting (Note 2)
26				DOG
27				PI1(注 3)
28 to 2B				For manufacturer setting (Note 2)
2C				DI0
2D				DI1
2E				DI2
2F to 3F				For manufacturer setting (Note 2)

Note 1. P: Position control mode
S: Internal speed control mode
T: Internal torque control mode
CP:Positioning mode (Point table method)
CL:Positioning mode (Program method)
2. For manufacturer setting. Never set this value.
3.It is valid in the positioning mode (Program method) only.
4.When operating temporarily without using EM1 such as at startup, etc., set the EM1 to automatic ON in parameter No.PD01.

(2) Symbol allocation using the setup software:
Changing pins CN1 – 4 from servo-on (SON) to gain switch (CDP):

① Change PD05 from 0202 to 0211 in the I/O settings tab.
② Select “Write All”.
③ **Cycle the power off, then on for the parametersto be enabled.**.


Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PD01 *DIA1 Input signal automatic ON selection 1 0C25 0000-FFFFh
PD02 *DI0 Input signal device selection 0 (CN1-23, CN1-25) 262D 0000-3F3Fh
PD03 *DI1-1 Input signal device selection 1L (CN1-3) 0303 0000-3F3Fh
PD04 *DI1-2 Input signal device selection 1H (CN1-3) 2003 0000-3F3Fh
PD05 *DI2-1 Input signal device selection 2L (CN1-4) 0211 0000-3F3Fh
PD06 *DI2-2 Input signal device selection 2H (CN1-4) 0202 0000-3F3Fh
PD07 *DI3-1 Input signal device selection 3L (CN1-5) 0D06 0000-3F3Fh
PD08 *DI3-2 Input signal device selection 3H (CN1-5) 2C0D 0000-3F3Fh
PD09 *DI4-1 Input signal device selection 4L (CN1-6) 070A 0000-3F3Fh
PD10 *DI4-2 Input signal device selection 4H (CN1-6) 0707 0000-3F3Fh
PD11 *DI5-1 Input signal device selection 5L (CN1-7) 080B 0000-3F3Fh
PD12 *DI5-2 Input signal device selection 5H (CN1-7) 0808 0000-3F3Fh
PD13 *DI6-1 Input signal device selection 6L (CN1-8) 0505 0000-3F3Fh
PD14 *DI6-2 Input signal device selection 6H (CN1-8) 0505 0000-3F3Fh
PD15 *DO1 Output signal device selection 1 (CN1-9) 0003 0000-003Fh
PD16 *DO2 Output signal device selection 2 (CN1-10) 0004 0000-003Fh
PD17 *DO3 Output signal device selection 3 (CN1-11) 0002 0000-003Fh
PD18 *DO4 Output signal device selection 4 (CN1-12) 0005 0000-003Fh
PD19 *DIF Input filter setting 0002 0000-0113h
PD20 *DOP1 Function selection D-1 0000 0000-0113h
Double click item to display detailed description.
Read All
Write
Verify
Write All
Set to default
Close
②

Parameter-maintenance
Performing batch write will overwrite all parameters. Are you sure you want to perform batch write?
OK
キャンセル

※ Please allocate pins CN1-4 separately.

※ See “LECSA Operation Manual”,section 4.4.2 for details on allocation of input signals to pins CN1-3 - CN1-8.

※ See “LECSA Operation Manual”,section 4.4.2 for details on allocation of Output signals to pins CN1-9 - CN1-12.

5.5.4 Setting a Maximum of 7 Points using the Point Table in Positioning mode (Point Table)

The point table can reach a maximum of 7 points using input signals DI0, DI1 and DI2.

Device	Symbol	Connector pin No.	Functions/Applications	I/O division	Positioning mode	
					CP	CL
Point table No. /Program No. selection 1	DI0	CN1-5	<In point table method> The point table No. and the home position return mode are selected by DI0 to DI2. <In program method> The program No. is selected by DI0 to DI2.	DI-1	○	○
Point table No. /Program No. selection 2	DI1	CN1-23		DI-1	○	○
Point table No. /Program No. selection 3	DI2			DI-1	△	△

(Note) Device			Selection description
DI2	DI1	DI0	Point table method
0	0	0	Home position return mode
0	0	1	Point table No. 1
0	1	0	Point table No. 2
0	1	1	Point table No. 3
1	0	0	Point table No. 4
1	0	1	Point table No. 5
1	1	0	Point table No. 6
1	1	1	Point table No. 7

Note. 0: off
1: on

The default allocation, allocates signals DI0 to (CN1-5) and DI1 to (CN1-23).
Note – CN1-23 can only be used if the input is configured as current sink NPN

4 points can be specified , however 1 point is reserved for the home position return, 3 points can be specified in the point table.

When using a maximum of 7 point tables, wiring and input signal allocation of the DI2 must be implemented.

(1) Example of Allocation of a Maximum of 7 Points in current SYNC (NPN) Interface

Changing pin CN1-7 from Reverse rotation start (ST2) to point table no./program no. selection 3 (DI2):

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Forced stop	EM1	CN1-8	DI-1	PD14	0505
Proximity dog	DOG	CN1-25	DI-1	PD02	262D
Servo-on	SON	CN1-4	DI-1	PD06	0202
Automatic /manual selection	MD0	CN1-3	DI-1	PD04	2003
Forward rotation start	ST1	CN1-6	DI-1	PD10	0707
① Reverse rotation start	ST2	CN1-7	DI-1	PD12	0808
Point table No. /Program No. selection 1	DI0	CN1-5	DI-1	PD08	2C0D
Point table No. /Program No. selection 2	DI1	CN1-23	DI-1	PD02	262D

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Forced stop	EM1	CN1-8	DI-1	PD14	0505
Proximity dog	DOG	CN1-25 Note)	DI-1	PD02	262D
Servo-on	SON	CN1-4	DI-1	PD06	0202
Automatic /manual selection	MD0	CN1-3	DI-1	PD04	2003
Forward rotation start	ST1	CN1-6	DI-1	PD10	0707
Point table No. /Program No. selection 3	DI2	CN1-7	DI-1	PD12	0808→ 2E08
Point table No. /Program No. selection 1	DI0	CN1-5	DI-1	PD08	2C0D
Point table No. /Program No. selection 2	DI1	CN1-23 Note)	DI-1	PD02	262D

① Change PD12 from 0808 to **2E**08.

PD12	*DI5-2	Input signal device selection 5H (CN1-7) Any input signal can be assigned to the CN1-7 pin. The devices that can be assigned and the setting method are the same as in parameter No. PD03. 2E Internal torque control mode Positioning mode Select the input device of the CN1-7 pin.	0808h

Setting	Control modes (Note 1)			
	P	S	T	CP/CL
00				
01	For manufacturer setting (Note 2)			
02	SON	SON	SON	SON
03	RES	RES	RES	RES
04	PC	PC		PC
05 (Note4)	EM1	EM1	EM1	EM1
06	CR			
07		ST1	RS2	ST1
08		ST2	RS1	ST2
09	TL1	TL1		TL1
0A	LSP	LSP		LSP
0B	LSN	LSN		LSN
0C	For manufacturer setting (Note 2)			
0D		SP1	SP1	
0E		SP2	SP2	
0F		SP3	SP3	
10	LOP	LOP	LOP	
11	CDP	CDP		CDP
12 to 1F	For manufacturer setting (Note 2)			
20				MD0
21 to 23				For manufacturer setting (Note 2)
24				TSTP
25				For manufacturer setting (Note 2)
26				DOG
27				PI1(注 3)
28 to 2B				For manufacturer setting (Note 2)
2C				DI0
2D				DI1
2E				DI2

Note 1. P: Position control mode
S: Internal speed control mode
T: Internal torque control mode
CP:Positioning mode (Point table method)
CL:Positioning mode (Program method)
2. For manufacturer setting. Never set this value.
3.It is valid in the positioning mode (Program method) only.
4.When operating temporarily without using EM1 such as at startup, etc., set the EM1 to automatic ON in parameter No.PD01.

(1) Example of Allocation of a Maximum of 7 Points in current Source (PNP) Interface

① Changing pins CN1-3 from Automatic/manual selection (MD0) to point table no./program no. selection 3 (DI2):

② Changing pins CN1-7 from Reverse rotation start (ST2) to point table no./program no. selection 2 (DI1):

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Forced stop	EM1	CN1-8	DI-1	PD14	0505
Proximity dog	DOG	CN1-25	DI-1	PD02	262D
Servo-on	SON	CN1-4	DI-1	PD06	0202
① Automatic /manual selection	MD0	CN1-3	DI-1	PD04	2003
Forward rotation start	ST1	CN1-6	DI-1	PD10	0707
② Reverse rotation start	ST2	CN1-7	DI-1	PD12	0808
Point table No. /Program No. selection 1	DI0	CN1-5	DI-1	PD08	2C0D
Point table No. /Program No. selection 2	DI1	CN1-23	DI-1	PD02	262D

Device	Symbol	Connector pin No	I/O division	Parameters No.	Initial value
Forced stop	EMI	CN1-8	DI-1	PD14	0505
Source(PNP) Assignment disable	-	CN1-25 Note	DI-1	PD02	262D→ 2620
Servo-on	SON	CN1-4	DI-1	PD06	0202
Point table No. /Program No. selection 3	DI2	CN1-3	DI-1	PD04	2003→ 2E03
Forward rotation start	ST1	CN1-6	DI-1	PD10	0707
Point table No. /Program No. selection 2	DI1	CN1-7	DI-1	PD12	0808→ 2D08
Point table No. /Program No. selection 1	DI0	CN1-5	DI-1	PD08	2C0D
Source(PNP) Assignment disable	-	CN1-23 Note	DI-1	PD02	262D→ 2620

① Change PD04 from 2003 to 2E03.

PD04	*DI1-2	Input signal device selection 1H (CN1-3) Any input signal can be assigned to the CN1-3 pin. The devices that can be assigned and the setting method are the same as in parameter No. PD03. 2E Internal torque control mode Position control mode Select the input device of the CN1-3 pin.	2003h

② Change PD12 from 0808 to 2D08.

PD12	*DI5-2	Input signal device selection 5H (CN1-7) Any input signal can be assigned to the CN1-7 pin. The devices that can be assigned and the setting method are the same as in parameter No. PD03. 2D Internal torque control mode Positioning mode Select the input device of the CN1-7 pin.	0808h

Setting	Control modes (Note 1)			
	P	S	T	CP/CL
00				
01	For manufacturer setting (Note 2)			
02	SON	SON	SON	SON
03	RES	RES	RES	RES
04	PC	PC		PC
05 (Note4)	EM1	EM1	EM1	EM1
06	CR			
07		ST1	RS2	ST1
08		ST2	RS1	ST2
09	TL1	TL1		TL1
0A	LSP	LSP		LSP
0B	LSN	LSN		LSN
0C	For manufacturer setting (Note 2)			
0D		SP1	SP1	
0E		SP2	SP2	
0F		SP3	SP3	
10	LOP	LOP	LOP	
11	CDP	CDP		CDP
12 to 1F	For manufacturer setting (Note 2)			
20				MD0
21 to 23				For manufacturer setting (Note 2)
24				TSTP
25				For manufacturer setting (Note 2)
26				DOG
27				PI1(注 3)
28 to 2B				For manufacturer setting (Note 2)
2C				DI0
2D				DI1
2E				DI2
2F to 3F				For manufacturer setting (Note 2)

Note 1. P: Position control mode
S: Internal speed control mode
T: Internal torque control mode
CP:Positioning mode (Point table method)
CL:Positioning mode (Program method)
2. For manufacturer setting. Never set this value.
3.It is valid in the positioning mode (Program method) only.
4.When operating temporarily without using EM1 such as at startup, etc., set the EM1 to automatic ON in parameter No.PD01.

Note

One example of signal allocation will be shown using the Setup Software. It is expected that the user will follow similar method applicable to the relevant signals that need reallocation.

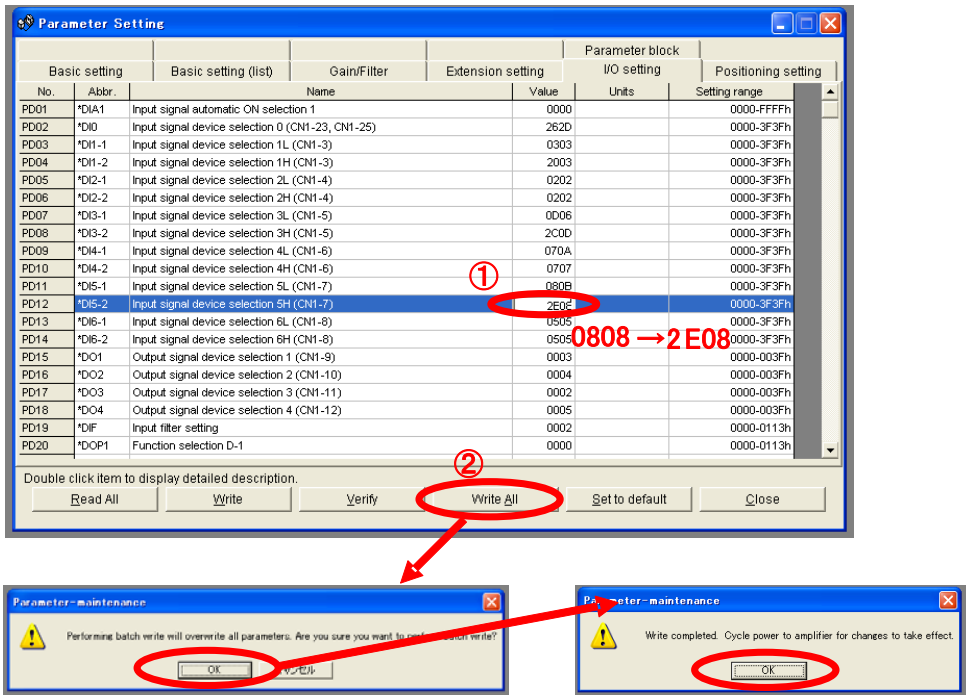
(1) Example of Signal Allocation using the setup software

When changing pins CN1-7 from Reverse rotation start (ST2) to point table no./program no. selection 3 (DI2):

① Change PD12 from 0808 to 2E08 in the I/O settings tab.

② Click “Write All”

③ **Cycle the power off, and then on for the parameters to be enabled.**

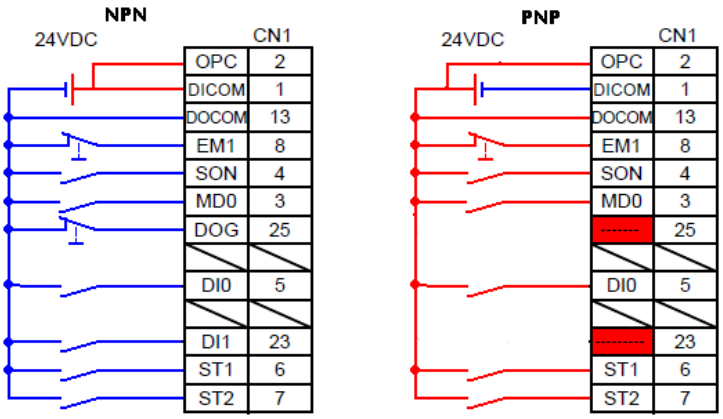

Parameter Setting
Parameter block
Basic setting
Basic setting (list)
Gain/Filter
Extension setting
I/O setting
Positioning setting
No. Abbr. Name Value Units Setting range
PD01 *DIA1 Input signal automatic ON selection 1 0000 0000-FFFFh
PD02 *DI0 Input signal device selection 0 (CN1-23, CN1-25) 262D 0000-3F3Fh
PD03 *DI1-1 Input signal device selection 1L (CN1-3) 0303 0000-3F3Fh
PD04 *DI1-2 Input signal device selection 1H (CN1-3) 2003 0000-3F3Fh
PD05 *DI2-1 Input signal device selection 2L (CN1-4) 0202 0000-3F3Fh
PD06 *DI2-2 Input signal device selection 2H (CN1-4) 0202 0000-3F3Fh
PD07 *DI3-1 Input signal device selection 3L (CN1-5) 0D06 0000-3F3Fh
PD08 *DI3-2 Input signal device selection 3H (CN1-5) 2C0D 0000-3F3Fh
PD09 *DI4-1 Input signal device selection 4L (CN1-6) 070A 0000-3F3Fh
PD10 *DI4-2 Input signal device selection 4H (CN1-6) 0707 0000-3F3Fh
PD11 *DI5-1 Input signal device selection 5L (CN1-7) 080B 0000-3F3Fh
PD12 *DI5-2 Input signal device selection 5H (CN1-7) 2E0E 0000-3F3Fh
PD13 *DI6-1 Input signal device selection 6L (CN1-8) 0505 0000-3F3Fh
PD14 *DI6-2 Input signal device selection 6H (CN1-8) 0505 0000-3F3Fh
PD15 *DO1 Output signal device selection 1 (CN1-9) 0003 0000-003Fh
PD16 *DO2 Output signal device selection 2 (CN1-10) 0004 0000-003Fh
PD17 *DO3 Output signal device selection 3 (CN1-11) 0002 0000-003Fh
PD18 *DO4 Output signal device selection 4 (CN1-12) 0005 0000-003Fh
PD19 *DIF Input filter setting 0002 0000-0113h
PD20 *DOP1 Function selection D-1 0000 0000-0113h
①
0808 → 2E08
②
Double click item to display detailed description.
Read All
Write
Verify
Write All
Set to default
Close
Parameter-maintenance
OK
Write completed. Cycle power to amplifier for changes to take effect.
OK

* Complete pin CN1-7 allocation separately.

* See “LECSA Operation Manual”,section 4.4.2 for details on allocation of input signals to pins CN1-3 - CN1-8

* See “LECSA Operation Manual”,section 4.4.2 for details on allocation of input signals to pins CN1-23 and CN1-25

* See “LECSA Operation Manual”,section 4.4.2 for details on allocation of output signals to pins CN1-9 and CN1-12



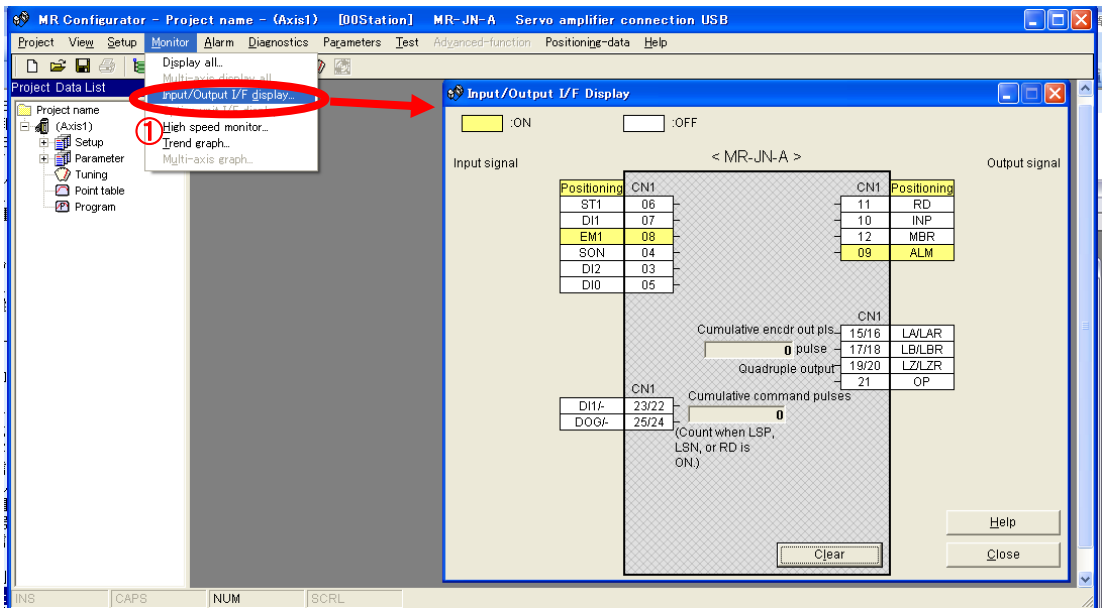
Schematics showing typical 3 point positioning

5.5.5 I/O Signal Allocation Check

The ON/OFF state (including layout check) and signal names allocated to CN1 can be checked. When parameters for PD02 - PD18 have been changed, It is necessary to confirm these are correctly assigned.

① From the Monitor menu of the Setup Software select Input/Output I/F Display. The Input/Output I/F Display window opens and displays the inputs and outputs that are applicable. The window also displays the applicable MODE. The highlighted background implies the signals are active.

Positioning mode (point table)

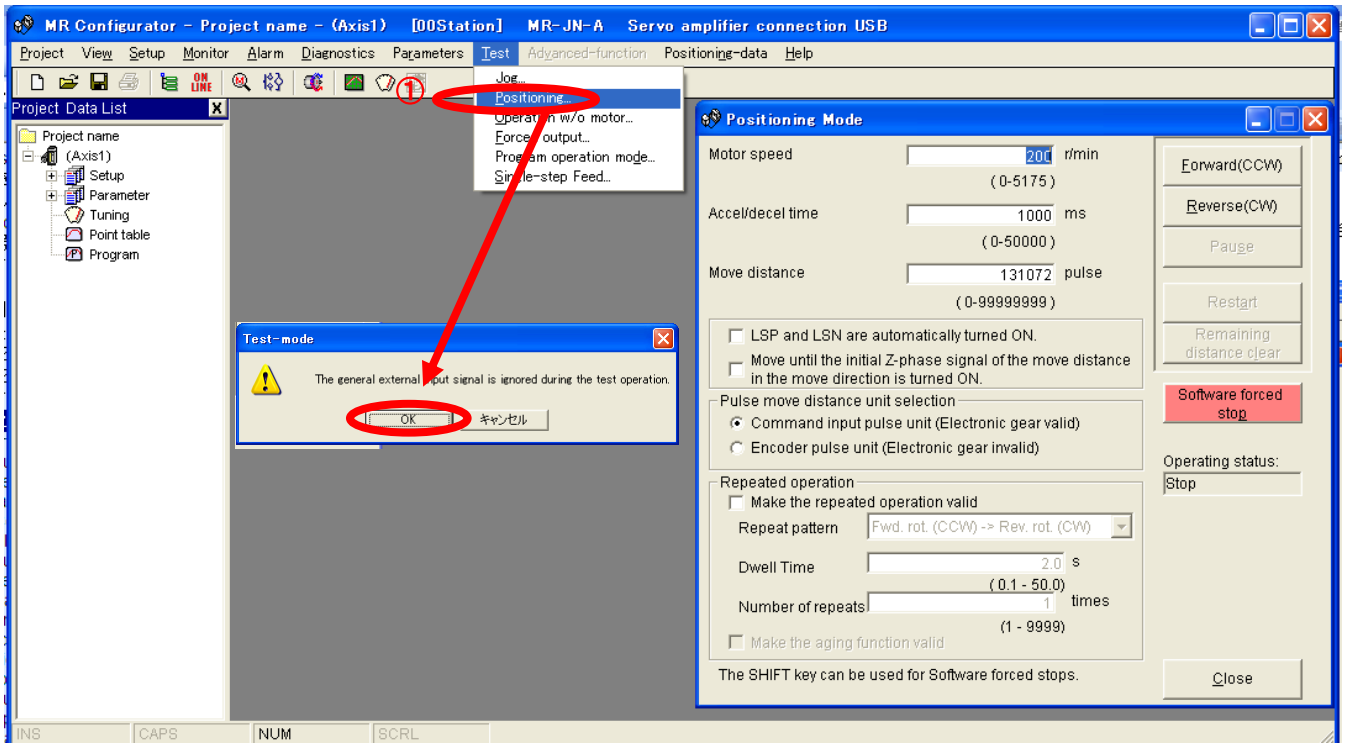


5.6 Positioning Mode in Setup Software

① Using the Setup Software menu Test select Positioning. The positioning Mode window opens and Test-mode window opensin the.

② Click OK. In the Test-mode

(When using this function, external input signal operation will be disabled. When controlling from a PLC or upper device, the power must be turned off and then on.)



5.6.1 Positioning Mode

① In order to prevent accidental impact at the end of the stroke, operate the actuator at a low speed initially. When changing speed or movement, increase the values whilst checking operation (Change motorspeed, acceleration/deceleration time, movement distance values if required).
See "LECSA Operation Manual (Simplified Edition)",section 5.6.2 for motorspeed configuration.
See "LECSA Operation Manual (Simplified Edition)",section 5.6.3 for acceleration/deceleration time configuration.
See "LECSA Operation Manual (Simplified Edition)",section 5.6.4 for move distance configuration.

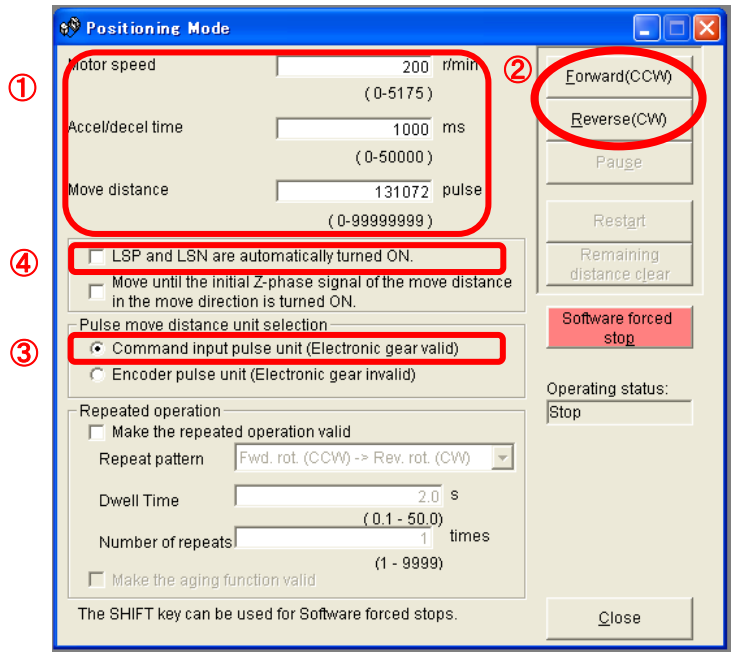
② Actuator positioning operates using [Forward (CCW)] and [Reverse (CW)].
(Check wiring and parameters if operation cannot be performed correctly).
When performing positioning operation in the setup software, the rotation direction of the actuator does not change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves in the direction of [Forward (CCW)] button and [Reverse (CW)] button.

③ Check the command impulse unit (electronic gear enabled).
The electronic gear duty set to PA05/PA06/PA07 will be enabled.

See "LECSA Operation Manual (Simplified Edition)",section 5.3.4 – "Parameter Values by Actuator Model" for PA05/PA06/PA07 settings for each actuator.
If PA05/PA06/PA07 are set to the values in "LECSA Operation Manual (Simplified Edition)",section 5.3.4– Parameter Values by Actuator Model, the travel distance of the actuator per 1 pulse will be calculated as follows.

【Position control mode (pulse input)】
・ travel distance of the actuator per 1 pulse ＝ 10[μm] (0.01[mm])
【Positioning mode】
・ travel distance of the actuator per 1 pulse ＝ 1[μm] (0.001[mm])

④ If the "Stroke-end" (LSP, LSN) signal is not configured as ON, an alarm may occur. (When checked, the "stroke-end" (LSP, LSN) will be automatically turned ON only when this window is open.)



Item	Setting range	Unit	Description
Motorspeed	0 ~ Allowed Speed for each actuator	r/min	Set the command speed of the servo motor for execution of positioning (**Motor rotations/min**).
Acceleration/deceleration time	0 ~ 50000	ms	Set the time until the servo motor reaches/stops to the rated speed **(3000 r/min)**
Move distance	0 ~ 99999999	pulse	Sets movement distance.

5.6.2 Motorspeed Configuration

<Rotation Speed Configuration>

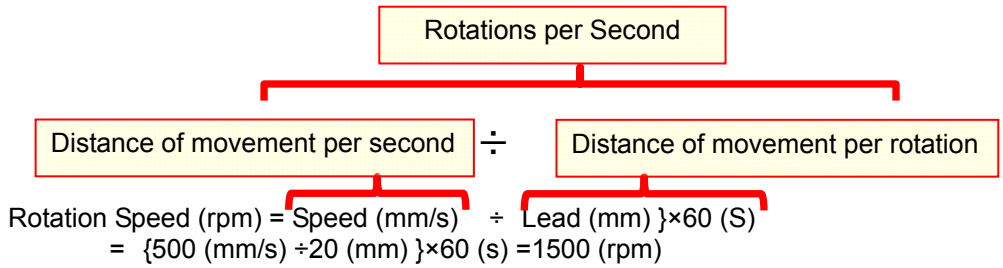
① Motorspeed (r/min) configuration.
*R/min (rpm): Indicated motor rotation speed (motor rotations/min)

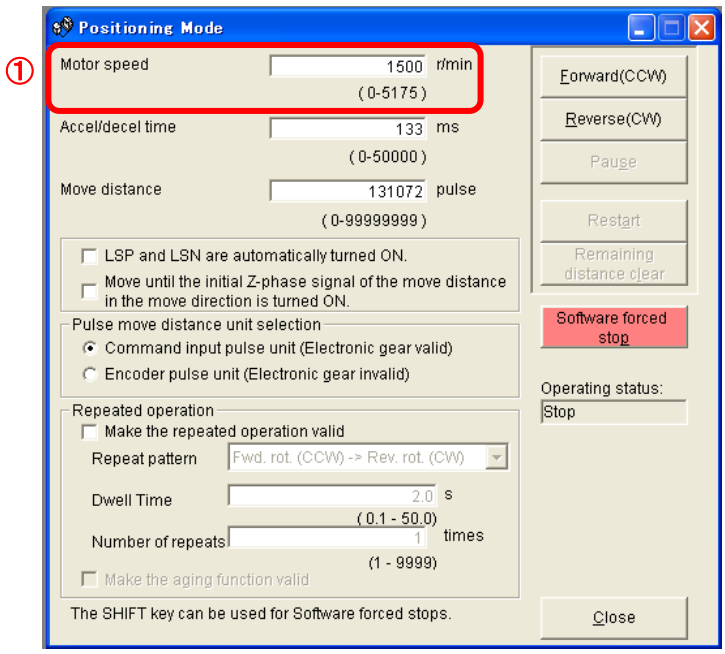
Rotation speed must be between 0 and the allowable speed limit for each actuator. Please be aware that the actuator will not operate if this is set to 0.

If the rotation speed is too low, this may cause vibration; check the actuator while changing settings.

Movement speed (mm/s) must be converted into rotation speed (r/min).
See below for the conversion formula.

Calculating motor speed conversion example using an actuator with a 20mm lead and 500 [mm/sec] speed.


Rotations per Second
Distance of movement per second
÷
Distance of movement per rotation
Rotation Speed (rpm) = Speed (mm/s) ÷ Lead (mm) }×60 (S)
= {500 (mm/s) ÷20 (mm) }×60 (s) =1500 (rpm)



5.6.3 Acceleration/deceleration Time Configuation

< Acceleration/deceleration Time Configuration**>**

① Acceleration/deceleration time (ms) configuration:
The acceleration/deceleration time sets the amount of time (ms) in which a prescribed number of rotations (3000[r/min]) is reached.
The acceleration/deceleration time must be set to a value between 0 and the allowable acceleration/deceleration speed for each actuator.

The acceleration/deceleration time must be converted from the acceleration/deceleration speed. See below for the conversion formula.

Calculating Acceleration/deceleration conversion example using an actuator with a 8 [mm] lead with an acceleration of 3000[mm/sec^2].

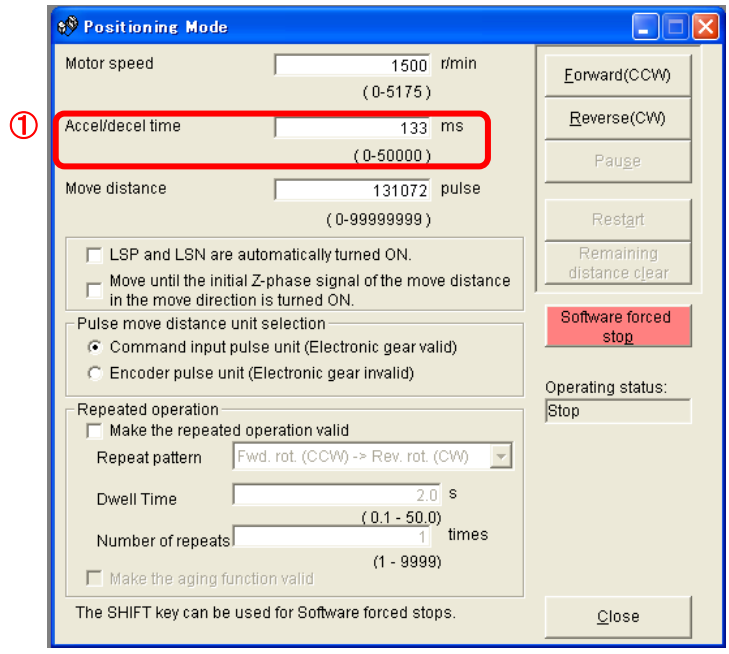
Speed at a rated motor rotation of 3000rpm

Accel/decel time **(ms)** = $\frac{\{\text{Rated Rotation Speed (r/min)} \div 60\ (S)\} \times \text{Screw Lead (mm)} \times 1000}{\text{Acceleration/deceleration speed (mm/s}^2\text{)}}$

***Acceleration speed is measured in ms, so this must be calculated as (s) ×1000**

Acceleration/deceleration time (ms) = $\frac{\{3000\ (\text{r/min}) \div 60\ (S)\} \times 8\ (\text{mm}) \times 1000}{3000\ (\text{mm/s}^2)}$

= 133 (ms)



5.6.4 Move distance Configuration and Operation< Move distance Configuration>

① Set the move distance [pulse]. Select a value within the stroke range.

② Actuator position will operate using [Forward (CCW)], [Reverse (CW)].
The position at which power is turned ON will be set as the home position, and the actuator will travel the amount set as move distance (check wiring and parameters If operation is not performed correctly).
When performing positioning operation in the setup software, the rotation direction of the actuator does not change if you change the setting of parameter PA14 (Rotation direction selection). The actuator moves in the direction of [Forward (CCW)] button and [Reverse (CW)] button.

③ Check command input pulse units (electronic gear enabled).
The electronic gear duty configured in PA05/PA06/PA07 will be enabled. See “LECSA Operation Manual (Simplified Edition)”,section 5.3.4 for setting values for PA05/PA06/PA07 in each actuator. If parameters PA05/PA06/PA07 are set according to“LECSA Operation Manual (Simplified Edition)”,section 5.3.4, the travel distance of the actuator per 1 pulse will be as follows.

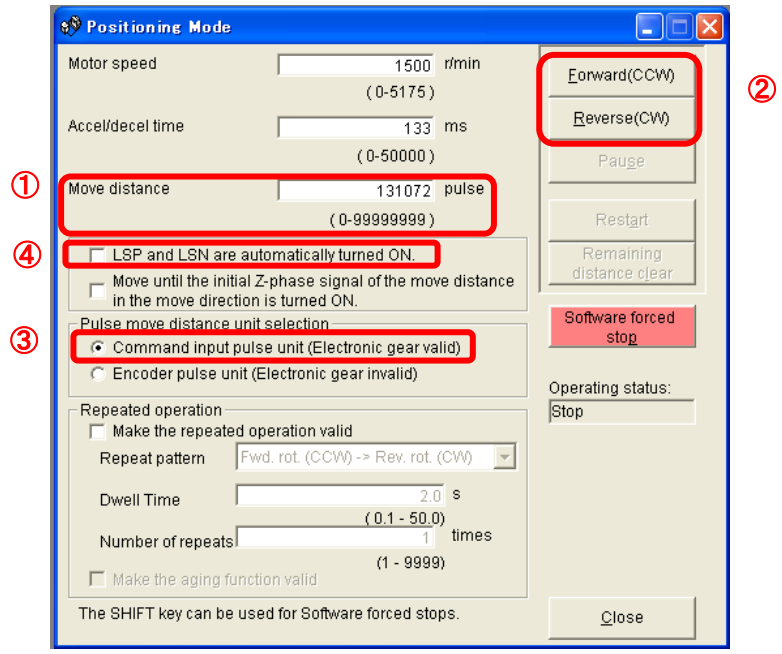
【Position control mode (pulse input)】
・ travel distance of the actuator per 1 pulse ＝ 10[μm] (0.01[mm])
【Positioning mode】
・ travel distance of the actuator per 1 pulse ＝ 1[μm] (0.001[mm])

Travel distance (mm) must be converted to tavel distance (pulse).
See below for the conversion formula. As an example, for a travel of 100m;

【Position control mode (pulse input】
Travel distance of the actuator per 1 pulse = 0.01 (mm) *1
100 (mm)/0.01 (mm) = 10000 (pulse)
【Positioning mode】
Travel distance of the actuator per 1 pulse = 0.001 (mm) *1
100 (mm)/0.001 (mm) = 100000 (pulse)

*1 The travel distance of the actuator per 1 pulse is set according to the electronic gears (PA05/PA06/PA07) outlined in 5.3.4 “Recommended Parameter Values by Actuator Model”.

④ If the stroke end signals (LSP, LSN) are not turned ON, an alarm may occur (If checked, the stroke end (LSP, LSN) signals will be turned ON automatically only when this window is open).
* Ensure that the [Forward (CCW)] and [Reverse (CW)] driving directions are checked. If the driving direction is unclear, operate the actuator slowly with a small move distance while checking the driving direction.



5.7 Positioning (Point Table) Operation using the Setup Software

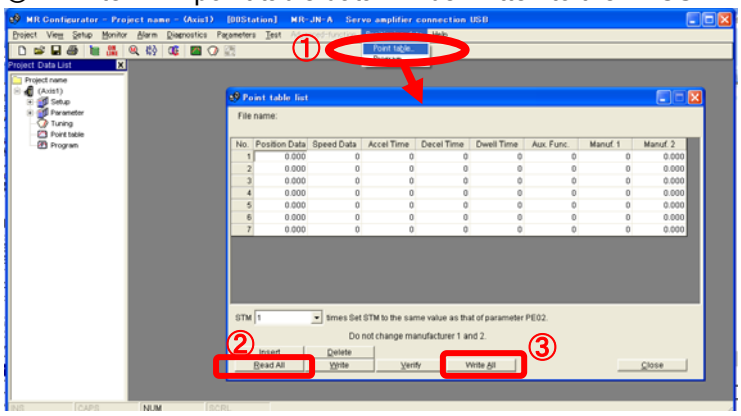
This feature is only available in positioning (point table) mode.
When positioning using the positioning (point table) mode, the point table (position data, speed data, acceleration time, deceleration time etc.) must be configured.

5.7.1 Point table List

① Using the “Positioning Data” menu in the setup software.The “Point table list” can be opened by selecting “Point Table”

② “Read All”： point table data will be read from the LECSA and displayed.

③ “Write All”： point table data will be written to the LECSA.



5.7.2 Point Table Data

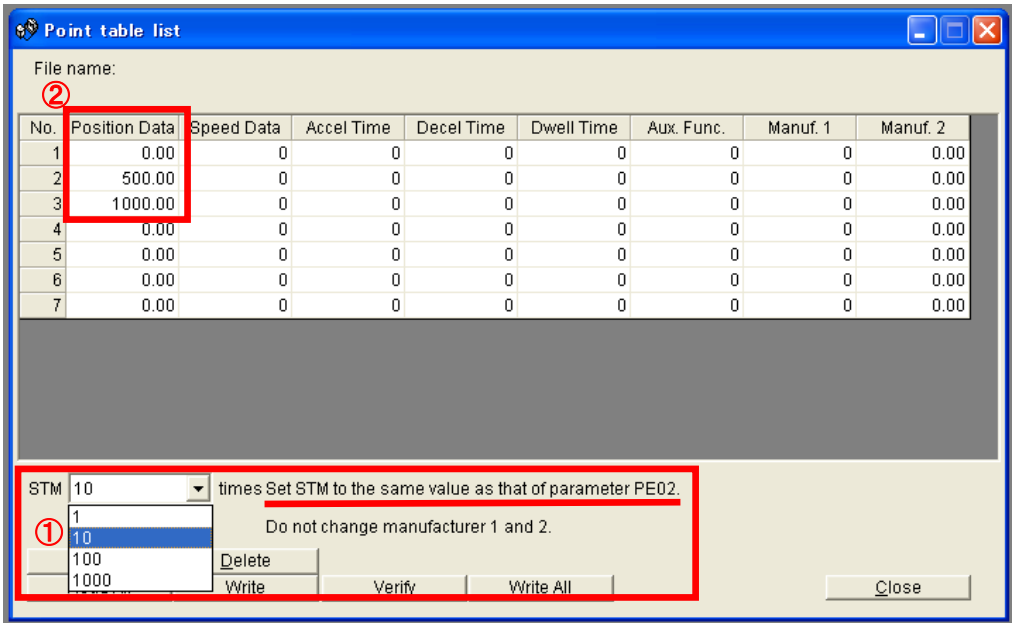
Item	Setting range	Unit	Description
Position data	−999.999 ~ 999.999	×10STM mm	(1) When using this point table as absolute value command system, set the target address (absolute value). (2) When using this point table as incremental value command system, set the travel distance. A "-" sign indicates a reverse rotation command. **Number of decimal places changes according to STM (**Feel length multiplication**)**
Servo motor speed	0 ~ allowable actuator speed	r/min	Sets the command rotation speed (**Motor rotations/min**) when positioning is executed.
Acceleration time constant	0 ~ 20000	ms	Set the time until the servo motor reaches to the rated speed. **(3000 r/min)**
Deceleration time constant	0 ~ 20000	ms	Set the time until the servo motor stops from the rated speed. **(3000 r/min**
Dwell	0 ~ 20000	ms	When dwell is set and the set dwell has passed after the position command of the selected point table is completed, the position command of the next point table is started. Set "0" in the auxiliary function to make the dwell invalid. Set "1" in the auxiliary function and 0 in the dwell to perform varied speed operation.
Auxiliary function	0 ~ 3		(1) When using this point table in the absolute value command system 0: Automatic operation is performed in accordance with a single point table chosen. 1: Operation is performed in accordance with consecutive point tables without a stop. (2) When using this point table in the incremental value command system 2: Automatic operation is performed in accordance with a single point table chosen. 3: Operation is performed in accordance with consecutive point tables without a stop. When a different rotation direction is set, smoothing zero (command output) is confirmed and the rotation direction is then reversed. Setting "1" in point table No. 7 results in an error.
Manuf .1 Manuf .2	Do not change.		

5.7.3 Point table (Position data) Configuration

< Position data Configuration>

① **For actuators with a stroke less than 1000mm, set** parameter PE02 (Feel length multiplication (STM) (Multiplier)) to 0000 and the STM value to x1.
For actuators with a stroke more than 1000mm, set parameter PE02 (Feel length multiplication (STM) (Multiplier)) to 0001 and the STM value to x10.

② Configure position data (mm). Set to a value within the stroke range.


Point table list
File name:
②
No. Position Data Speed Data Accel Time Decel Time Dwell Time Aux. Func. Manuf. 1 Manuf. 2
1 0.00 0 0 0 0 0 0 0.00
2 500.00 0 0 0 0 0 0 0.00
3 1000.00 0 0 0 0 0 0 0.00
4 0.00 0 0 0 0 0 0 0.00
5 0.00 0 0 0 0 0 0 0.00
6 0.00 0 0 0 0 0 0 0.00
7 0.00 0 0 0 0 0 0 0.00
STM 10
times Set STM to the same value as that of parameter PE02.
①
1
10
100
1000
Do not change manufacturer 1 and 2.
Delete
Write
Verify
Write All
Close

③Set the feed length multiplication (STM) of position data in parameter No. PE02 (Feeding function selection).

Parameter No. PE02 setting	Feed unit [μm]	Position data input range [mm]
□□□0	1	-999.999 to +999.999
□□□1	10	-9999.99 to +9999.99
□□□2	100	-99999.9 to +99999.9
□□□3	1000	-999999 to +999999

* If electronic gear parameters (PA05/PA06/PA07) are set according to “LECSA Operation Manual (Simplified Edition)”,section 5.3.4 in positioning mode:

The smallest unit for actuator movement is 1[μm] (0.001[mm]).

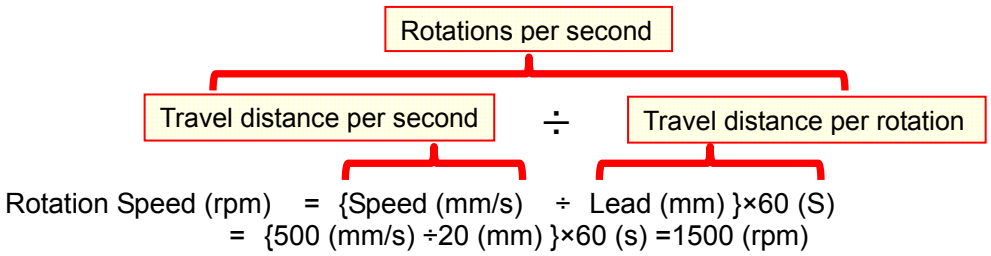
5.7.4 Point table (Servo Mmotor Speed) Configuration

<Rotation Speed Configuration>

① Rotation speed configuration:
*R/min (rpm): motor command rotation speed (motor rotations/min)

Travel speed (mm/s) must be converted into rotation speed (r/min).
See below for the conversion formula.

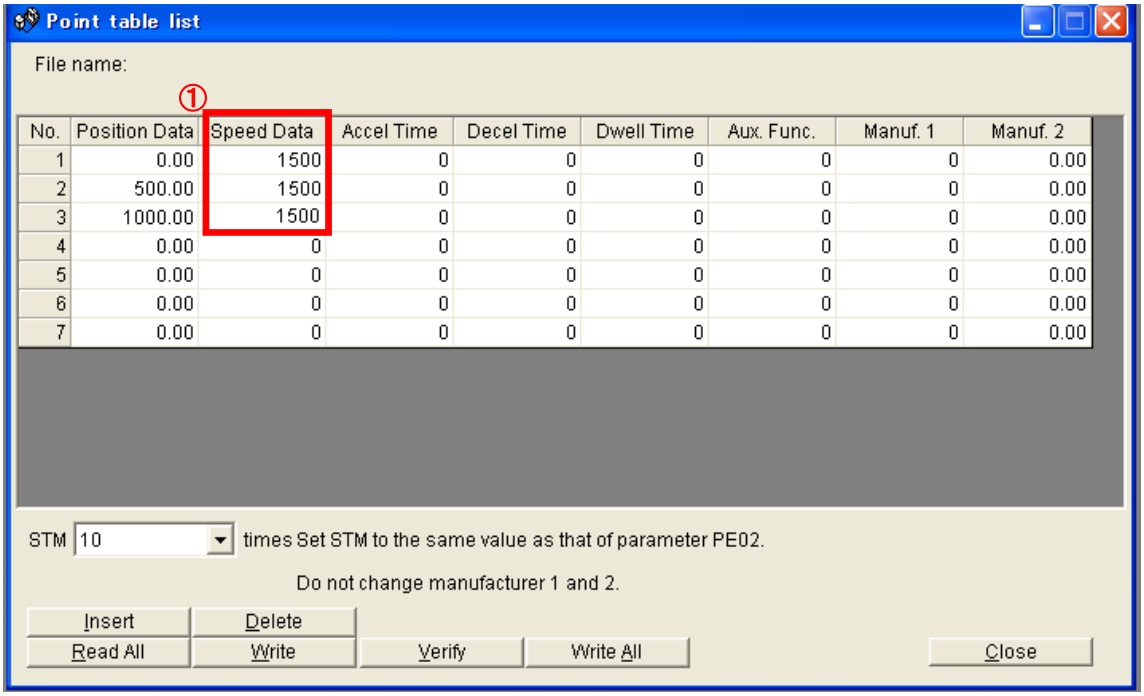
Example using a 20[mm] Lead Actuator with target travel speed of 500[mm/sec]



Rotation Speed (rpm) = {Speed (mm/s) ÷ Lead (mm) }×60 (S)
= {500 (mm/s) ÷20 (mm) }×60 (s) =1500 (rpm)

The rotation speed must be a value between 0 and the allowable actuator speed. The actuator will not operate if set to 0.

Too low rotation speed (r/min), may cause vibration (resonance);


Point table list
File name:
①
No. Position Data Speed Data Accel Time Decel Time Dwell Time Aux. Func. Manuf. 1 Manuf. 2
1 0.00 1500 0 0 0 0 0 0.00
2 500.00 1500 0 0 0 0 0 0.00
3 1000.00 1500 0 0 0 0 0 0.00
4 0.00 0 0 0 0 0 0 0.00
5 0.00 0 0 0 0 0 0 0.00
6 0.00 0 0 0 0 0 0 0.00
7 0.00 0 0 0 0 0 0 0.00
STM 10 times Set STM to the same value as that of parameter PE02.
Do not change manufacturer 1 and 2.
Insert
Delete
Read All
Write
Verify
Write All
Close

5.7.5 Point Table (Acceleration time constant/Deceleration time constant) Configuration

< Acceleration time constant/Deceleration time constant Configuration**>**

① Acceleration time constant (ms)/Deceleration time constant (ms) configuration:

Acceleration/deceleration (mm/s^2) must be converted to the acceleration time constant/deceleration time constant (ms). See below for the conversion formula.

Conversion example for a 8[mm] lead actuator driven at an acceleration of 3000 [mm/sec^2]

Rated Motor Rotation Speed (mm/s)

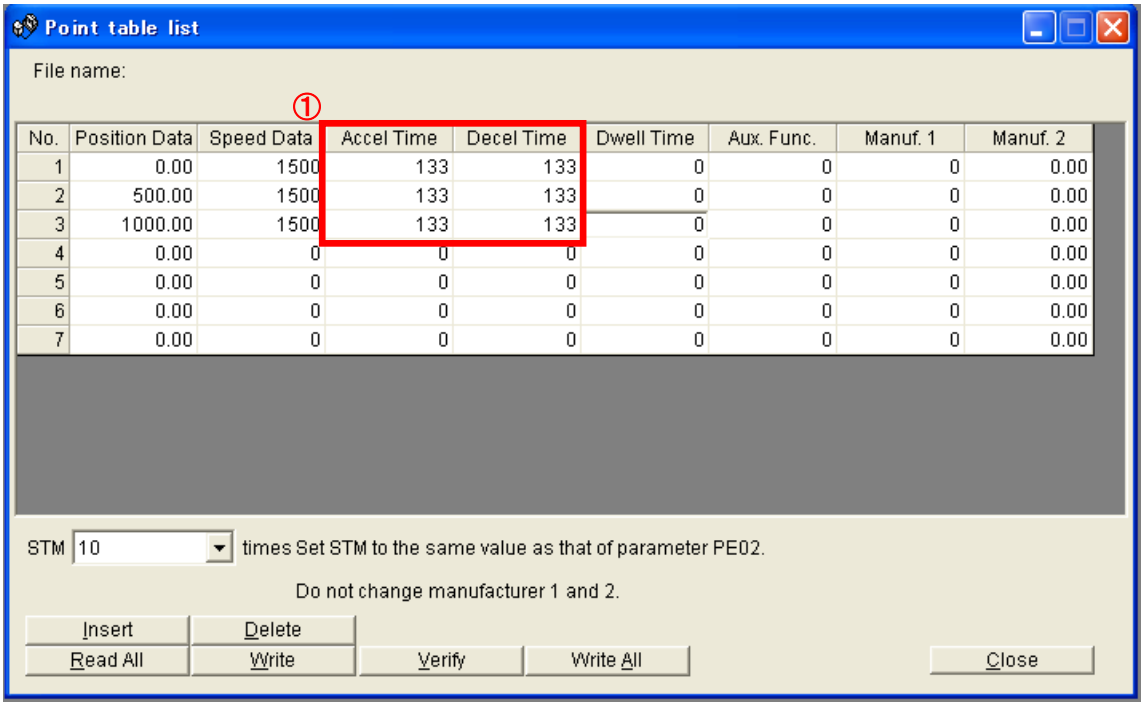
Acceleration time constant/deceleration time constant (ms) = $\frac{\{\text{Rated rotation speed (r/min)} \div 60\ (S)\} \times \text{screw lead (mm)} \times 1000}{\text{Acceleration/deceleration speed (mm/s}^2\text{)}}$

***As the scceleration time constant/deceleration time constant units are in ms; this is calculated as (s) ×1000**

Acceleration/Deceleration time constant (ms) = $\frac{\{3000\ (r/min) \div 60\ (S)\} \times 8\ (mm) \times 1000}{3000\ (mm/s^2)}$

= 133 (ms)

The acceleration time constant/deceleration time constant defines the time in (ms) when the motor rotations of (3000[r/min]) are met.
The acceleration time constant/deceleration time constant must be a number between 0 and the allowable acceleration/deceleration speed range for each actuator.


Point table list
File name:
①
No. Position Data Speed Data Accel Time Decel Time Dwell Time Aux. Func. Manuf. 1 Manuf. 2
1 0.00 1500 133 133 0 0 0 0.00
2 500.00 1500 133 133 0 0 0 0.00
3 1000.00 1500 133 133 0 0 0 0.00
4 0.00 0 0 0 0 0 0 0.00
5 0.00 0 0 0 0 0 0 0.00
6 0.00 0 0 0 0 0 0 0.00
7 0.00 0 0 0 0 0 0 0.00
STM 10 times Set STM to the same value as that of parameter PE02.
Do not change manufacturer 1 and 2.
Insert
Delete
Read All
Write
Verify
Write All
Close

5.7.6 Other Settings

The dwell and auxiliary functions are set to 0 as default.
Do not change Manuf .1 (0) or Manuf .2 (0.00) from the initial values.

5.7.7 Single-Step Feed

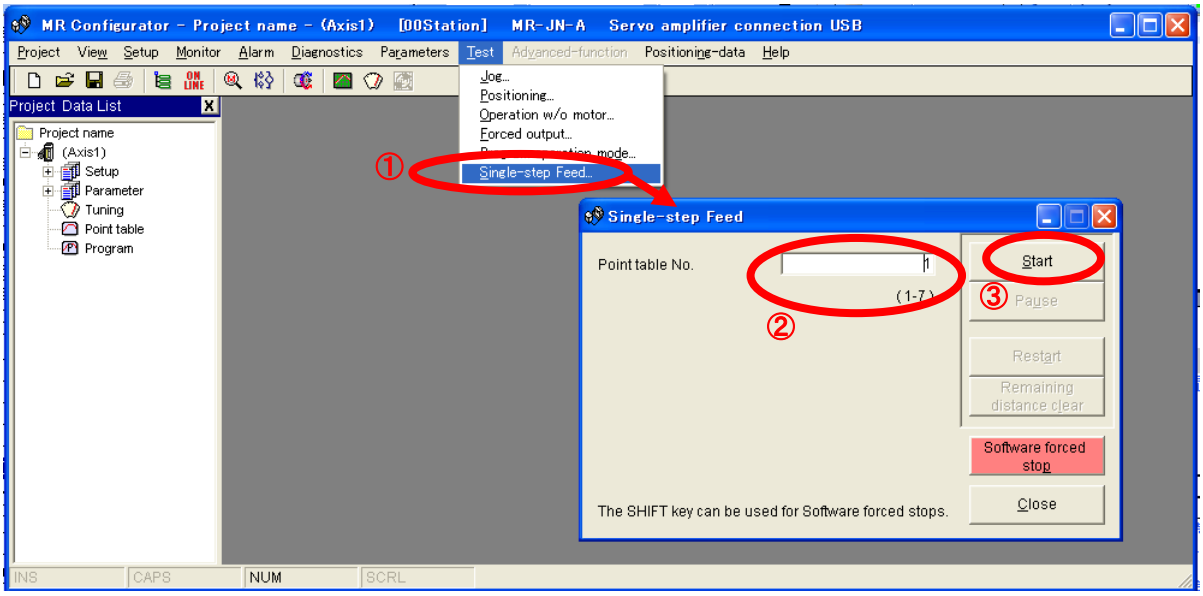
In Test mode a single step within point table can be executed.

① From the “Test” menu in the setup software select “Single-step Feed”which opens a window for “Single-step feed”. (When using this function, external input signal operation will be disabled. If controlling using a PLC or other upper device, ensure the power is turned off and then on before operation.)

② Select point table number.

③ Press “Start”.

The actuator will set the position at which the power was turned on as the home position (0), and move towards the defined point table position.



* Check parameters PA05/PA06/PA07 parameters (electronic gear duty) if an unexpected move was observed.

Note

* Home position return cannot be performed in test mode.

In Test mode the default position of the actuator is set as the home position when the power was turned on.It is therefore possible to drive the actuator past the stroke ends. Please pay particular attention to the position of the actuator on power up.

5.8 Saving/Loading Parameters

5.8.1 Saving Parameters

① From the “Project” menu in the setup software select “Save As Project” opens a window “Save As Project”.

② Enter a project name.

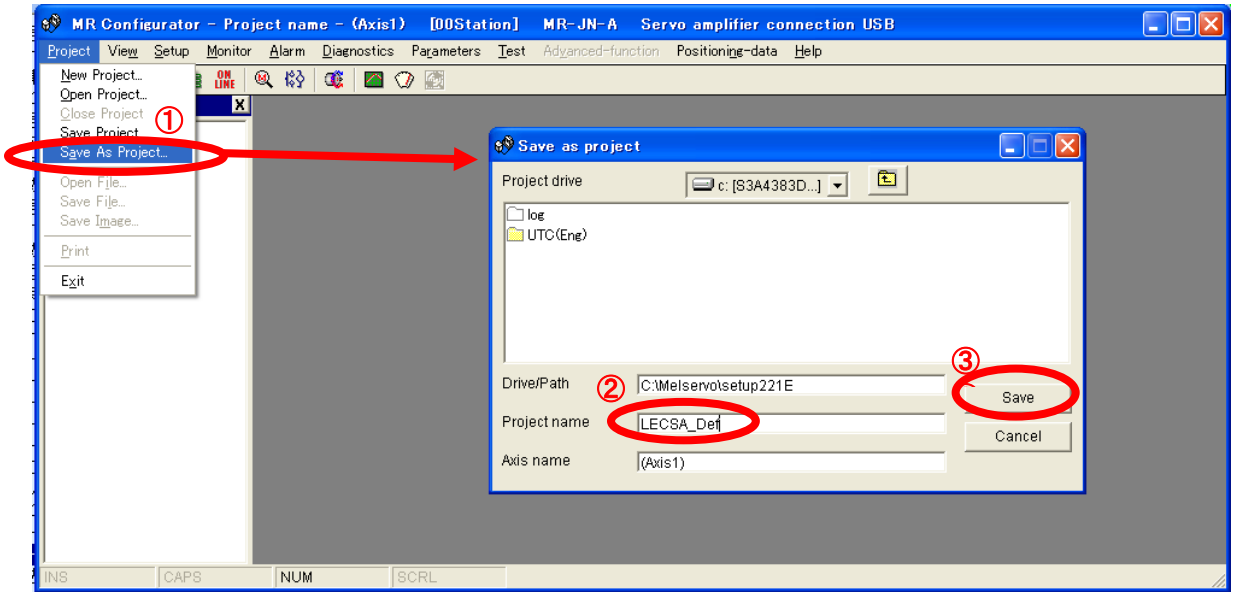
③ Click “Save”.

Files will be saved to the default folder “C:/Melservo/setup221/*project name*
(If the path is changed then, the files will be saved to the new path /*project name*)

Files Saved

device.prd	I/O signal device selection parameters setting file
paramet.prm	Settings files for parameters PA, PB, PC, PD and PE
project.prj	Project information file
point.ptbn	Point table data file. (Files will not be created in position control mode (pulse input))

* Note Always upload current parameters from the driver to the software before saving.
(See “LECSA Operation Manual (Simplified Edition)”,section 5.2.6 for uploading.)



5.8.2 To Load saved Parameters

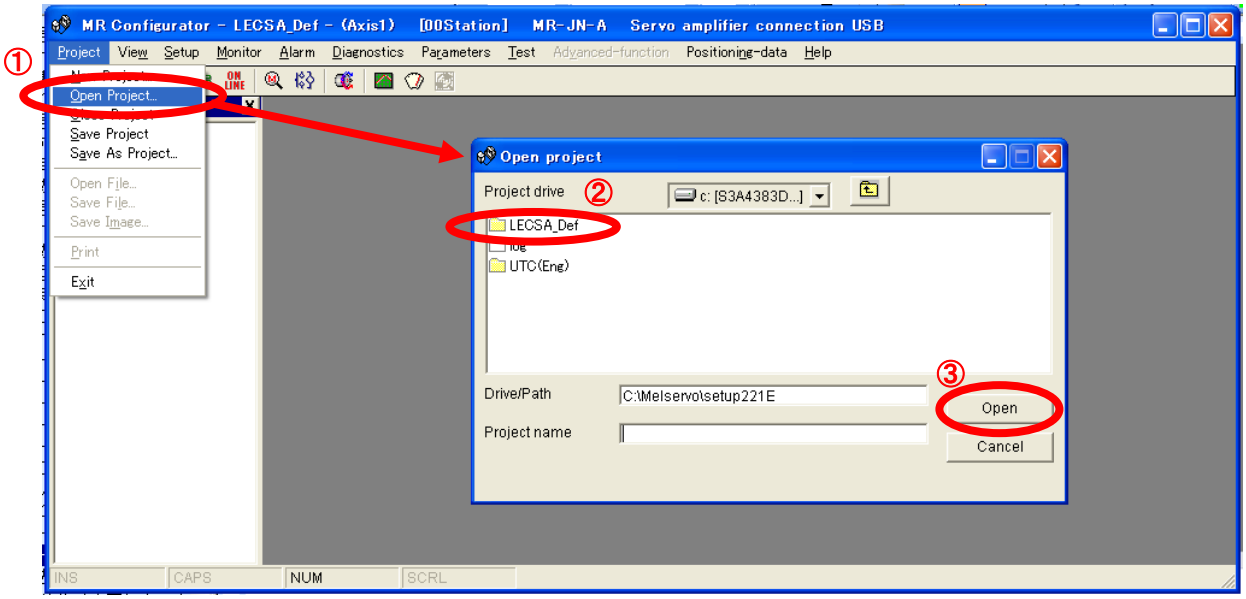
① “Open Project” from the “Project” menu using the setup software The “Open Project” window will open.

② Select the drive/bus/*project name* of the saved parameters.

③ Click “Open”.

Parameters will be loaded.

* If the “project.prj” file name differs to that selected in ②, parameters may not be able to be loaded. Please move all project files to drive/bus/*project name* “project.prj”.



6. Home Position Return Method

6.1 Position Control Mode (Pulse Input)

When using the home position return in position control mode (pulse input), use the home position return function in the positioning module of the upper PLC.
Please see product operation manuals for positioning module layouts, parameter configuration, home position return method etc.

6.2 Positioning mode (point table)

In positioning mode (point table) a home position return function is available. There are 6 types of home position return as shown below. See "LECSA Operation Manual",section 13.6 for details.

Type	Home position return method	Features
Dog type	With Deceleration started at the detection of front edge of a proximity dog switch signal, the position where the first Z-phase signal is given past the rear edgeof the dog signal or a motion has been made over the home position shift distance starting from the Z-phase signal is defined as a home position. (Note)	・General home position return method using a proximity dog. ・Good repeat accuracy of home position return ・Decreases product load. ・Used when the width of the proximity dog can be set greater than the deceleration distance of the servo motor.
Count type	With Deceleration started at the detection of front edge of a proximity dog switch signal, the position where the first Z-phase signal is given after advancement over the preset moving distance after the proximity dog switch signal or a motion has been made over the home position shift distance starting from the Z-phase signal is defined as a home position.	・Home position return method using a proximity dog. ・Used when it is minimisation of the proximity dog length is required.
Data set type	An arbitrary position defined as a home position.	・No proximity dog required.
Stopper type	The position where the actuator stops when its slider is pressed against a machine stop is defined as a home position.	・Since the machine part collides with the machine be fully lowered. ・The machine and stopper strength must be increased.
Home position ignorance (Servo-on position as home position)	The position where servo is switched on is defined as a home position.	
Dog type rear end reference	The position where the axis, which had started dcceleration of the front edge of a proximity dog switch signal, has moved the after-proximity dog moving distance and home position shift distance after it has passed the rear edge of proximity dog switch signal is defined as a home position.	・Z-phase signal not required.
Count type front end reference	The position where the axis, which had started dcceleration at the front edge of a proximity dog switch signal, has moved the after-proximity dog moving distance and home position shift distance is defined as a home position.	・Z-phase signal not required.
Dog cradle type	The position where the first Z-phase signal is detected after detection of the proximity dog front edge signal is defined as a home position.	

Note. The Z-phase signal is a signal recognised in the driver once per servo motor revolution. This cannot be used as an output signal.

Set parameter PE03 (Home position return type) for home position return. The parameter recommended in "LECSA Operation Manual (Simplified Edition)",section 5.3.4 is the stopper type (PE03 : 0003). Please select the home position return as appropriate to the customer application.

Parameter No. PE03

0			

Home position return type .....(a)
0: Dog type
1: Count type
2: Data set type
3: Stopper type
4: Home position ignorance
(Servo-on position as home position)
5: Dog type rear end reference
6: Count type front end reference
7: Dog cradle type

6.2.1 Stopper type home position return

In stopper type home position return, a machine part is pressed against a stopper using JOG operation to make a home position return and that position is defined as the home position.

(1) Devices and Pparameters

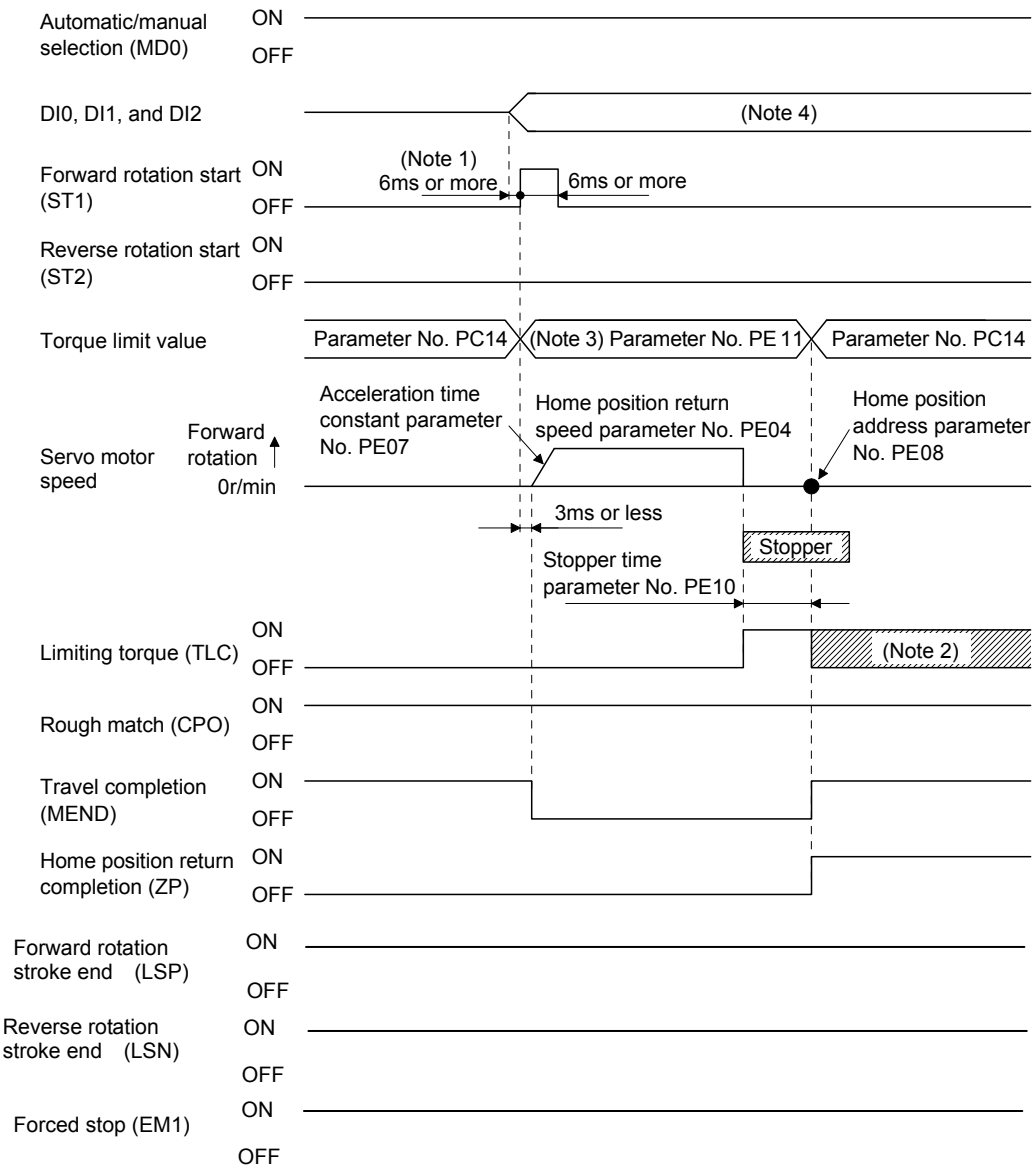
Configure the input devices and parameters as shown below.

Item	Device/Parameter used	Description
Manual home position return mode selection	Automatic/manual selection (MD0)	Turn MD0 ON.
	Point table No./Program No. selection 1 to 3 (DI0 to DI2)	Point table: Select the home position return mode by turning OFF DI0, DI1 and DI2. Program: Select a program that has the home position return "ZRT" command.
Stopper type home position return	Parameter No. PE03	□ □ □ 3: Stopper type home position return is selected.
Home position return direction	Parameter No. PE03	Select the home position return direction.
Home position return speed	Parameter No. PE04	Set the speed till contact with the stopper.
Stopper time	Parameter No. PE10	Time from when the part makes contact with the stopper to when home position return data is obtained to output home position return completion (ZP).
Stopper type home position return torque limit value	Parameter No. PE11	Set the servo motor torque limit value for execution of stopper type home position return.
Home position return Acceleration time constant	Parameter No. PE07	Set the Acceleration time constant during a home position return.
Home position return position data	Parameter No. PE08	Set the current position at home position return completion.

Note

* To set [PE**], set parameter write inhibit [PA19] to "00E".

(2) Timing chart



Note 1. External input signal detection is delayed by the input filter setting time of parameter No. PD19. Implement a sequence that changes DI0, DI1 and DI2 ahead of time by considering delays in output signal sequence from the PC or PLC and variations of a signal change due to hardware.

2. TLC turns ON when the torque reaches the value set in forward torque limit (parameter No. PA11),reverse torque limit (parameter No. PA12) or internal torque limit (parameter No. PC14).

3. The torque limit that is enabled at this point is as follows.

(Note) Input device	Limit value status			Validated torque limit values
TL1				
0				Parameter No. PE11
1	Parameter No. PC14	>	Parameter No. PE11	Parameter No. PE11
	Parameter No. PC14	<	Parameter No. PE11	Parameter No. PC14

Note. 0: off
1: on

4. Point table method: Select the home position return mode by turning OFF DI0, DI1 and DI2.
Program method: Select the program that has the home position return "ZRT" command.

The set value in parameter No. PE08 (home position return position data) is applied as position address at the time of the home position return being completed.

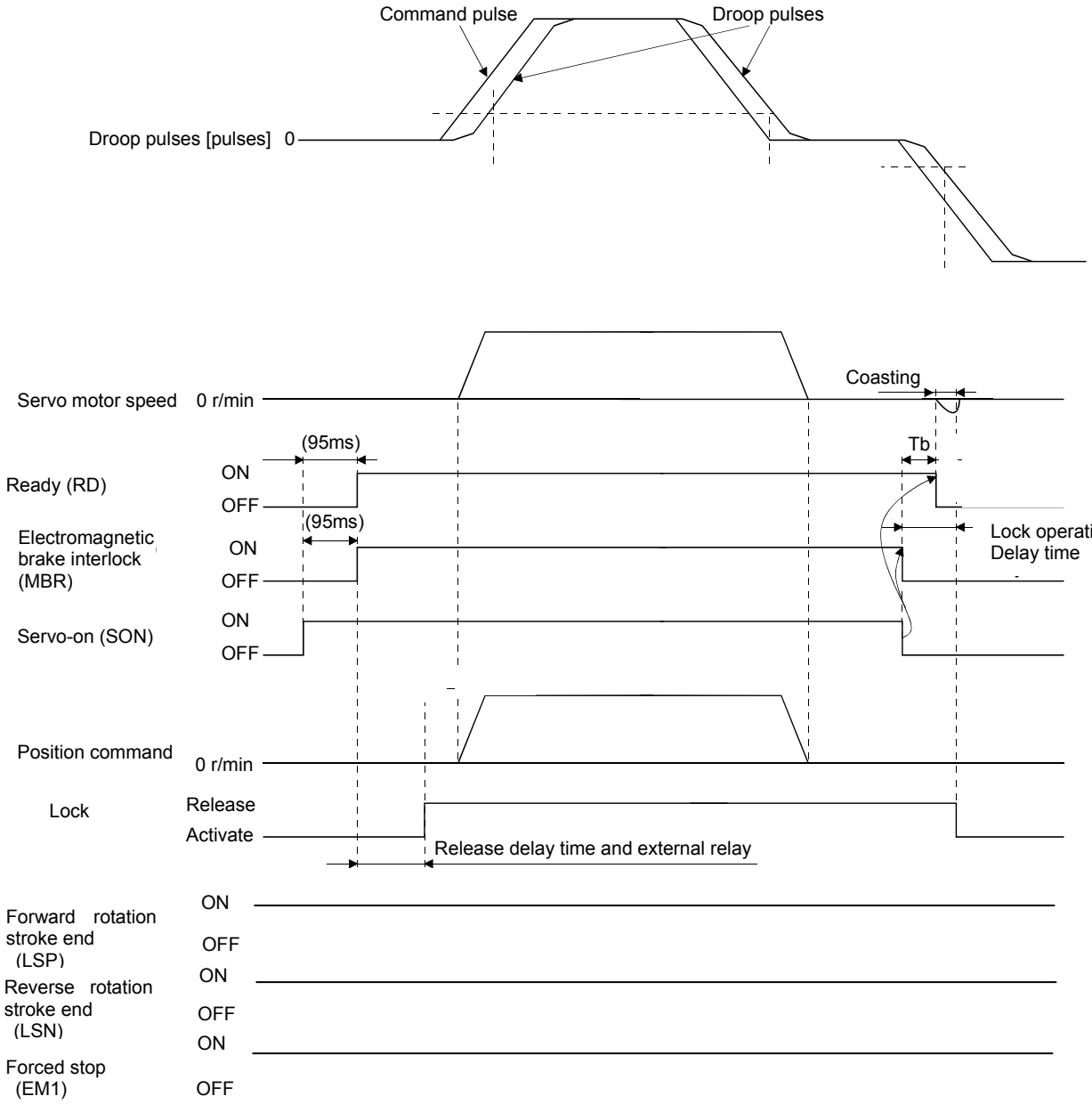
7. Diriving Methods for Each Mode

7.1 Position Control Mode (Pulse Input)

The motor rotation speed and direction is controlled using the pulse train and executes positioning operation.

7.1.1 Position Control Mode Instructions

The command pulse sent as input to the driver from the positioning unit and the driver operates the actuator in accordance with the command pulse. The command pulse and driver operation examples are shown below.



7.2 Speed control mode

This mode allows for accurate, smooth control of the rotation speed and direction of the servo motor.
* To set [PC**], set parameter write restriction [PA19] to "00E".

7.2.1 Speed Control Mode Operation Instruction

The servo motor will rotate when signal ST1 and ST2 turn on. An operation example of the speed control mode is shown below.

Internal speed command settings

Speed command and speed

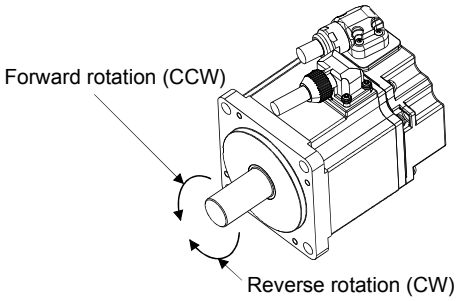
The servo motor operates at the speed set in parameters.

Up to 8 speeds can be set to the internal speed command.

The following table indicates the rotation direction according to forward rotation start (ST1) and reverse rotation start (ST2) combination.

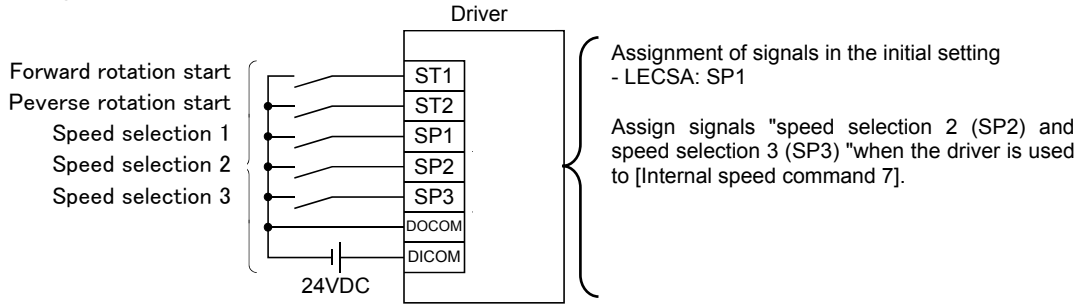
(Note 1) Input device		(Note 2) Rotation direction
ST2	ST1	
0	0	Stop (Servo lock)
0	1	Forward rotation (CCW)
1	0	Reverse rotation (CW)
1	1	Stop (Servo lock)

Note 1. 0: off
1: on
2. If the torque limit is canceled during servo lock, the servo motor may suddenly rotate according to position deviation in respect to the command position.



Connect the wirings as follows when operating in forward or reverse rotation with the internal speed command set to the eighth speed.

Note that the inputs are configured as Current sink NPN Type



Refer to “LECSA Operation Manual (Simplified Edition)”,section 5.5 for signal assignment.

LECSA Speed Command Parameter Setting

(Note) Input device			Speed command value	
SP3	SP2	SP1		
0	0	0	Internal speed command 0 (parameter No. PC05)	Initial phase
0	0	1	Internal speed command 1 (parameter No. PC06)	
0	1	0	Internal speed command 2 (parameter No. PC07)	
0	1	1	Internal speed command 3 (parameter No. PC08)	
1	0	0	Internal speed command 4 (parameter No. PC31)	
1	0	1	Internal speed command 5 (parameter No. PC32)	
1	1	0	Internal speed command 6 (parameter No. PC33)	
1	1	1	Internal speed command 7 (parameter No. PC34)	

Note. 0:OFF
1:ON

8 patterns of speed configurations are available for LECSA,.

7.3 Torque control mode

Servo motor output torque is controlled. Speed control function is also available.

* To set [PC**], set parameter write restriction [PA19] to "00E".

7.3.1 Torque Control Mode Operation Instruction

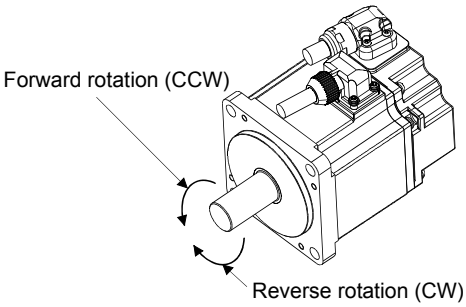
The servo motor will rotate when signal RS1 and RS2 turn on. An operation example of the torque control mode is shown below. Internal torque command settings:

Torque is controlled by the internal torque command set in parameter No. PC12.

If the internal torque command is small, the torque may vary when the actual speed reaches the speed limit value. In such case, increase the speed limit value.

The following table indicates the torque generation directions determined by the forward rotation selection (RS1) and the reverse rotation selection (RS2) when the internal torque command (parameter No. PC12) is used.

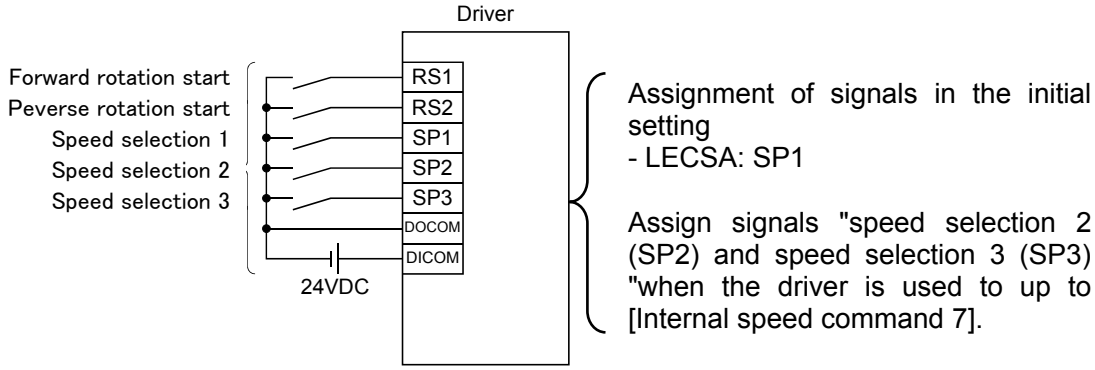
(Note) Input device		Rotation direction	
RS2	RS1	Internal torque command (parameter No. PC12)	
		0.1 to 100.0%	0.0%
0	0	Torque is not generated.	Torque is not generated.
0	1	CCW (reverse rotation in driving mode/forward rotation in regenerative mode)	
1	0	CW (forward rotation in driving mode/reverse rotation in regenerative mode)	
1	1	Torque is not generated.	



Note. 0: off
1: on

Generally, make connection as shown below.

Note that the inputs are configured as Current sink NPN Type



Refer to “LECSA Operation Manual (Simplified Edition)”,section 5.5 for assignment of signal.

LECSA speed restricted parameter setting

(Note) Input device			Speed command value	
SP3	SP2	SP1		
0	0	0	Internal speed command 0 (parameter No. PC05)	Initial phase
0	0	1	Internal speed command 1 (parameter No. PC06)	
0	1	0	Internal speed command 2 (parameter No. PC07)	
0	1	1	Internal speed command 3 (parameter No. PC08)	
1	0	0	Internal speed command 4 (parameter No. PC31)	
1	0	1	Internal speed command 5 (parameter No. PC32)	
1	1	0	Internal speed command 6 (parameter No. PC33)	
1	1	1	Internal speed command 7 (parameter No. PC34)	

Note. 0:OFF
1:ON

For LECSA, 8 patterns of speed setting are available.

7.4 Point table method

Positioning operation can be executed by setting the position data, rotation speed, acceleration time constant, deceleration time constant to the point table data. (The maximum points that can be set in point table is 7.)

7.4.1 Operation Instruction of Point Table system

Select the point table No. represented by the values of DI0, DI1 and DI2. Start the operation by selecting ST1 or ST2.

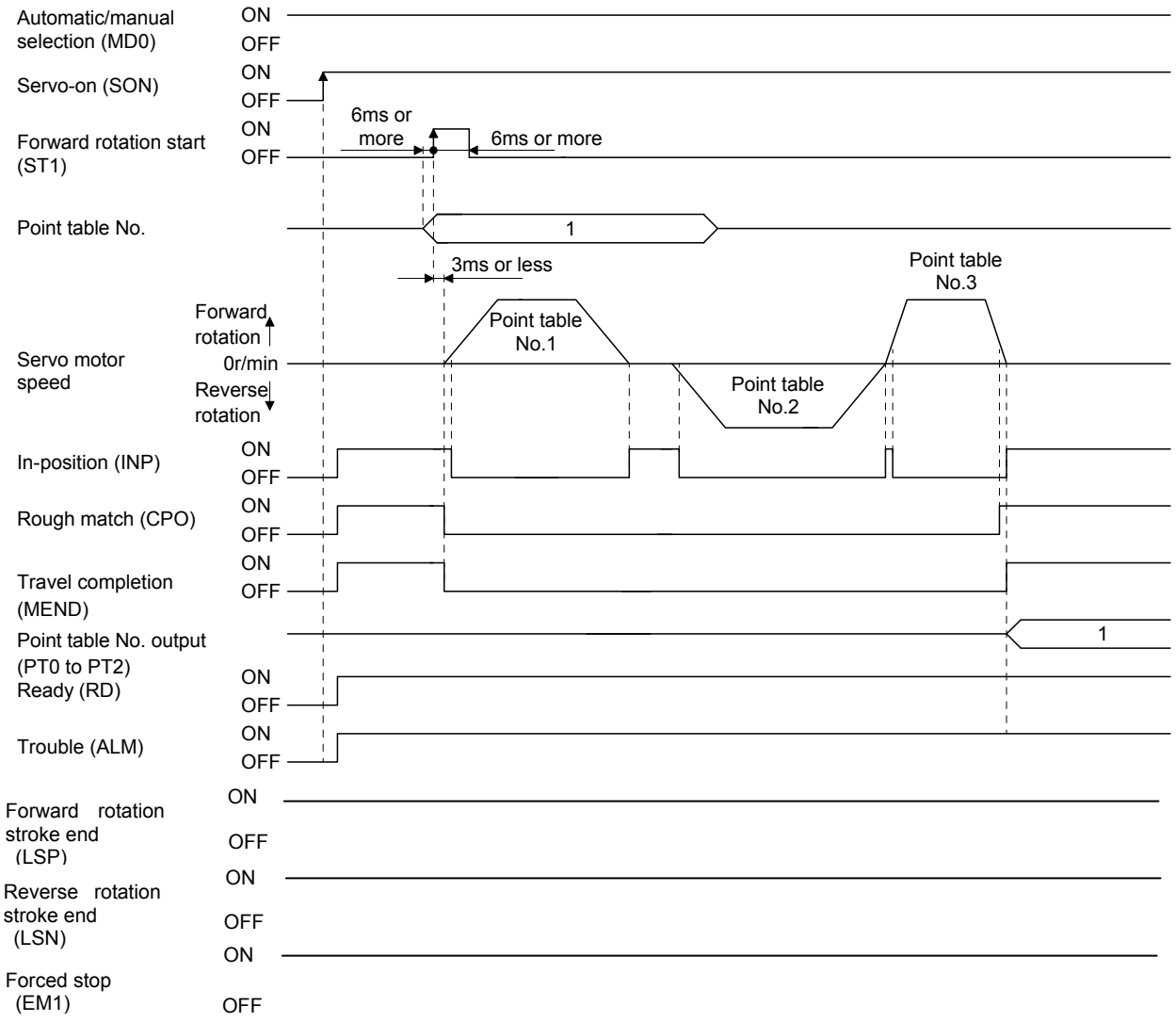
<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Functions/Applications</th><th rowspan="2">I/O division</th><th colspan="2">Positioning mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Point table No. /Program No. selection 1</td><td>DI0</td><td>CN1-5</td><td rowspan="4"><In point table method>
The point table No. and the home position return mode are selected by DI0 to DI2.
<In program method>
The program No. is selected by DI0 to DI2.

(Note) Device: DI2 DI1 DI0 / Selection description: Point table method
0 0 0 — Home position return mode
0 0 1 — Point table No. 1
0 1 0 — Point table No. 2
0 1 1 — Point table No. 3
1 0 0 — Point table No. 4
1 0 1 — Point table No. 5
1 1 0 — Point table No. 6
1 1 1 — Point table No. 7

Note. 0: off
1: on</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Point table No. /Program No. selection 2</td><td>DI1</td><td>CN1-23</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Point table No. /Program No. selection 3</td><td>DI2</td><td></td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Program input 1</td><td>PI1</td><td></td><td>Turn PI1 on to resume the step stopped by the SYNC (1) command in the program.</td><td>DI-1</td><td></td><td>△</td></tr>
</table>

Point table No.	Position data [×10^{STM}μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function
1	5.00	3000	100	150	100	1
2	-6.00	2000	100	100	0	3
3	3.00	3000	50	50	0	0 (Note)

Note. Always set "0" or "2" to the auxiliary function in the last point table among the consecutive point tables.
0: When point table is used in absolute value command system
2: When point table is used in incremental value command system

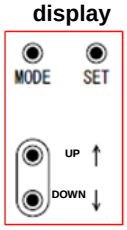

Automatic/manual selection (MD0)
ON
OFF
Servo-on (SON)
ON
OFF
Forward rotation start (ST1)
ON
OFF
6ms or more
6ms or more
Point table No.
1
3ms or less
Point table No.3
Forward rotation
Servo motor speed
0r/min
Reverse rotation
Point table No.1
Point table No.2
In-position (INP)
ON
OFF
Rough match (CPO)
ON
OFF
Travel completion (MEND)
ON
OFF
Point table No. output (PT0 to PT2)
1
Ready (RD)
ON
OFF
Trouble (ALM)
ON
OFF
Forward rotation stroke end (LSP)
ON
OFF
Reverse rotation stroke end (LSN)
ON
OFF
Forced stop (EM1)
ON
OFF

7.4.2 Setting method

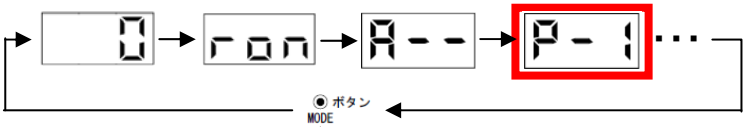
(1) Setting with the button on the front of the driver

Ex.) When the servo motor rotation speed of point table No.3 is changed from 2500 (r/min) to 1000 (r/min) .

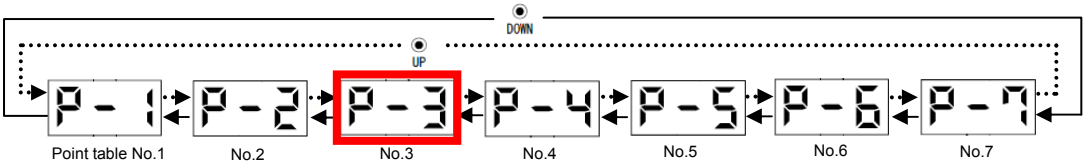
Driver operation display



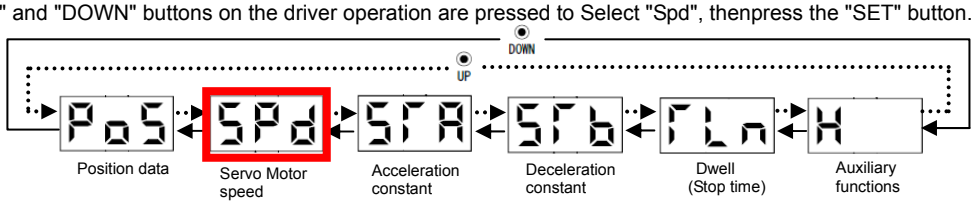
a. When the "MODE" button on the driver operation is pressed, the display will be shifted as shown below.
Select "P-1".



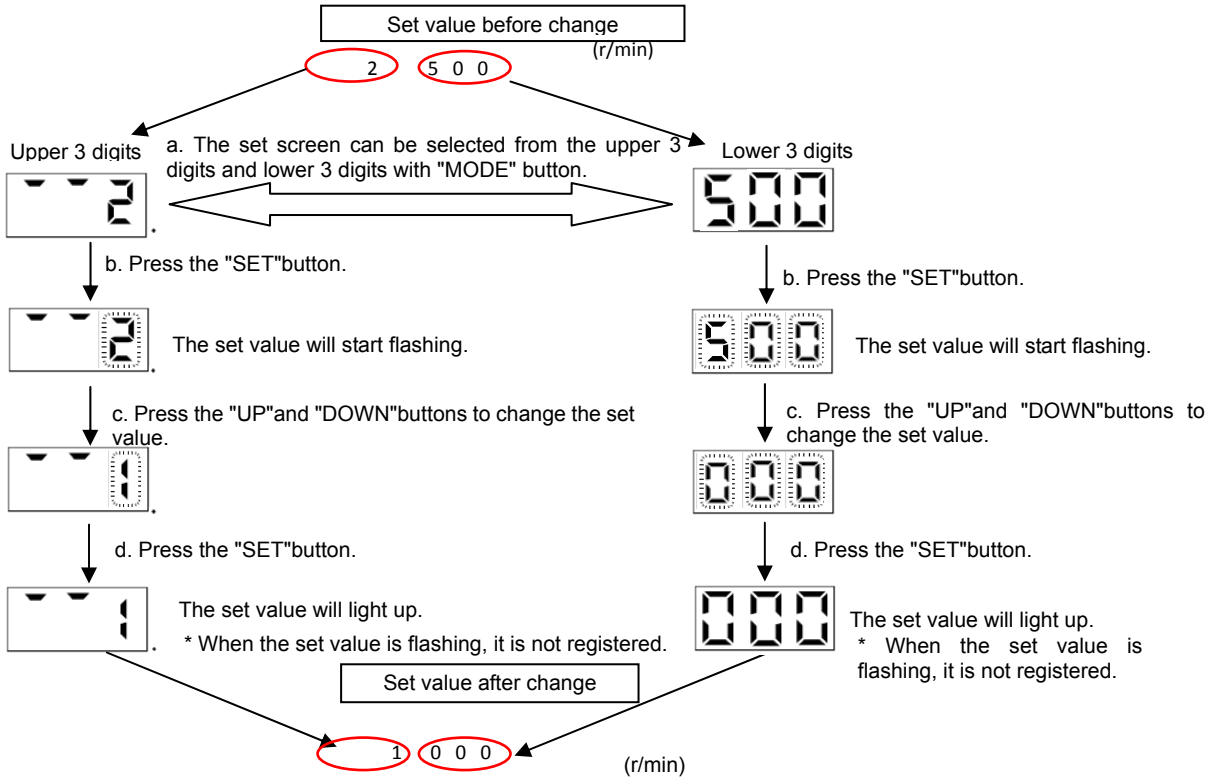
b. When the "UP" and "DOWN" buttons on the driver operation are pressed, the display will be shifted as shown below, Select "P-3" and press the "SET" button.



c. The "UP" and "DOWN" buttons on the driver operation are pressed to Select "Spd", thenpress the "SET" button.



- 500 is displayed. The lower 3 digits of the set value are displayed. The operation procedure is described below.
When the "MODE" button is pressed, the upper 3 digits are displayed. Change the set value as shown below.


Set value before change
(r/min)
2 5 0 0
Upper 3 digits
a. The set screen can be selected from the upper 3 digits and lower 3 digits with "MODE" button.
Lower 3 digits
b. Press the "SET"button.
The set value will start flashing.
c. Press the "UP"and "DOWN"buttons to change the set value.
d. Press the "SET"button.
The set value will light up.
* When the set value is flashing, it is not registered.
Set value after change
1 0 0 0
(r/min)

Refer to “LECSA Operation Manual”,chapter 13 for details.

7.5 Positioning Mode (Programimg Method)

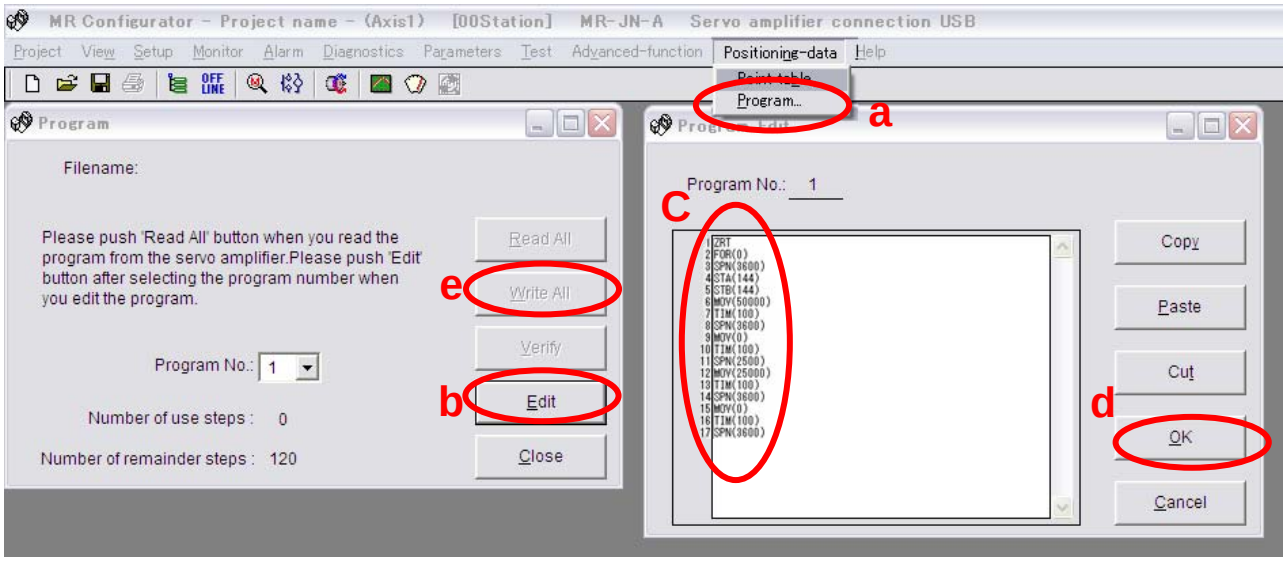
To perform the positioning operation, create a program using position data, rotation speed, acceleration constant and deceleration constant (The maximum number of programs is 8 for which a total of 120 steps can be created per program). Install the set up software,MR Configurator™ :LEC-MR-SETUP221E which is required for setting the program data with the program system.

*1. Software version C5 or higher is required.
*2. Setup software should be prepared by the user.
*3. USB cable (LEC-MR-J3USB) is required for software installation.

See “LECSA Operation Manual”,section 13.4 for details regarding the positioning mode (programming method).
See “LECSA Operation Manual”,section 13.9 for details regarding programming methods.

7.5.1 Setting method

a. Launch the setup software and select [Program (P)] of [Positioning data].
b. Select [Edit] on the program window to open the program edition window.
c. Create programs.
d. Click [OK].
e. Program data is written to the driver with [Write All] on the program window.



7.5.2 Command in the program system

An example of the program commands is shown below.

The maximum number of program steps is 120. Though up to 8 programs can be created, the total number of each program steps is up to 120.
The set program can be selected using point table no./program no. selection 1 (DI0) to point table no./program no. selection 3 (DI2).

(1) Command list

Command	Name	Setting	Setting range	Unit	Indirect addressing	Description
SPN	Speed (Motor speed)	SPN (Setting value)	0 to instantaneous permissible speed	r/min	○	Used to set the command speed of the servo motor for positioning. The set value should be equal to or less than the instantaneous permissible speed of the servo motor.
STA	Acceleration time constant	STA (Setting value)	0 to 20000	ms	○	Used to set the Acceleration time constant. The set value is the time in which the servo motor reaches the rated speed from a stop. It cannot be changed during command output.
STB	Deceleration time constant	STB (Setting value)	0 to 20000	ms	○	Used to set the Deceleration time constant. The set value is the time in which the servo motor stops from the rated speed. It cannot be changed during command output.

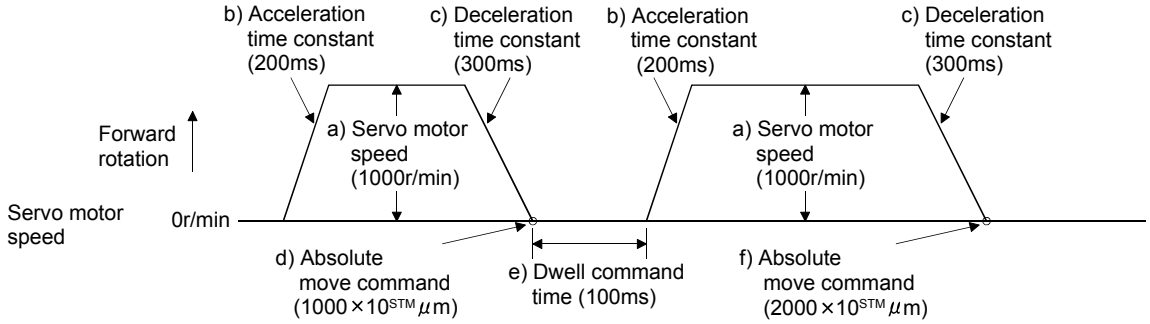
7.5.3 Operation Instruction Method of Program System

Select the program No. represented by the values of DI0, DI1 and DI2 and start the operation by selecting ST1.

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Functions/Applications</th><th rowspan="2">I/O division</th><th colspan="2">Positioning mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Point table No. /Program No. selection 1</td><td>DI0</td><td>CN1-5</td><td rowspan="3"><In point table method>
The point table No. and the home position return mode are selected by DI0 to DI2.
<In program method>
The program No. is selected by DI0 to DI2.

(Note) Device / Selection description
DI2 DI1 DI0 / Program method
0 0 0 Program No. 1
0 0 1 Program No. 2
0 1 0 Program No. 3
0 1 1 Program No. 4
1 0 0 Program No. 5
1 0 1 Program No. 6
1 1 0 Program No. 7
1 1 1 Program No. 8
Note. 0: off
1: on</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Point table No. /Program No. selection 2</td><td>DI1</td><td>CN1-23</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Point table No. /Program No. selection 3</td><td>DI2</td><td></td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Program input 1</td><td>PI1</td><td></td><td>Turn PI1 on to resume the step stopped by the SYNC (1) command in the program.</td><td>DI-1</td><td></td><td>△</td></tr>
</table>

Program	Description		
SPN (1000)	Speed (Motor speed)	1000[r/min]	a)
STA (200)	Acceleration time constant	200[ms]	b)
STB (300)	Deceleration time constant	300[ms]	c)
MOV (1000)	Absolute move command	1000[×10^{STM}μm]	d)
TIM (100)	Dwell command time	100[ms]	e)
MOV (2000)	Absolute move command	2000[×10^{STM}μm]	f)
STOP	Program end		


b) Acceleration time constant (200ms)
c) Deceleration time constant (300ms)
b) Acceleration time constant (200ms)
c) Deceleration time constant (300ms)
Forward rotation
a) Servo motor speed (1000r/min)
a) Servo motor speed (1000r/min)
Servo motor speed
0r/min
d) Absolute move command (1000×10STMμm)
e) Dwell command time (100ms)
f) Absolute move command (2000×10STMμm)

8. Troubleshooting

8.1 Alarms and Warning List

POINT

・As soon as an alarm occurs, turn off servo-on (SON) and the main circuit power supply.

When a fault occurs during operation, the corresponding alarm or warning is displayed. If an alarm or warning occurrs, refer to “LECSA Operation Manual”,section 8.2 or “LECSA Operation Manual”,section 8.3 and take the appropriate action. When an alarm occurs, ALM turns off.
After removing the cause of the alarm, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column. The warning is automatically canceled after removing the cause of occurrence.

	No.	LED display	Name	Alarm deactivation		
				Power OFF→ON	Press "SET" on current alarm screen.	Alarm reset (RES)
Alarms	A.10	A.10	Undervoltage	○	○	○
	A.12	A.12	Memory error 1 (RAM)	○		
	A.13	A.13	Clock error	○		
	A.15	A.15	Memory error 2 (EEP-ROM)	○		
	A.16	A.16	Encoder initial communication error1	○		
	A.17	A.17	Board error	○		
	A.19	A.19	Memory error 3 (Flash-ROM)	○		
	A.1A	A.1A	Motor combination error	○		
	A.1C	A.1C	Software combination error	○		
	A.1E	A.1E	Encoder initial communication error 2	○		
	A.1F	A.1F	Encoder initial communication error 3	○		
	A.20	A.20	Encoder normal communication error 1	○		
	A.21	A.21	Encoder normal communication error 2	○		
	A.24	A.24	Main circuit error	○	○	○
	A.30	A.30	Regenerative error	(Note 1) ○	(Note 1) ○	(Note 1) ○
	A.31	A.31	Overspeed	○	○	○
	A.32	A.32	Overcurrent	○		
	A.33	A.33	Overvoltage	○	○	○
	A.35	A.35	Command frequency error	○	○	○
	A.37	A.37	Parameter error	○		
	A.45	A.45	Main circuit device overheat	(Note 1) ○	(Note 1) ○	(Note 1) ○
	A.46	A.46	Servo motor overheat	(Note 1) ○	(Note 1) ○	(Note 1) ○
	A.50	A.50	Overload 1	(Note 1) ○	(Note 1) ○	(Note 1) ○
	A.51	A.51	Overload 2	(Note 1) ○	(Note 1) ○	(Note 1) ○
	A.52	A.52	Error excessive	○	○	○
	A.8E	A.8E	USB communication error	○	○	○
	888	888	Watchdog	○		

	No.	3-digit, 7-segment LED display	Name	The servo motor stops /does not stop.
Warning	A.90	A.90	Home positioning incomplete warning	Stops
	A.91	A.91	Driver overheat warning	Does not stop
	A.96	A.96	Home position setting error	Stops
	A.97	A.97	Program operation disabled	Does not stop
	A.98	A.98	Software limit warning	Stops (Note 2)
	A.99	A.99	Stroke limit warning	Stops (Note 2)
	A.E0	A.E0	Excessive regeneration warning	Does not stop
	A.E1	A.E1	Overload warning 1	Does not stop
	A.E6	A.E6	Servo forced stop warning	Stops
	A.E9	A.E9	Main circuit off warning	Stops
	A.EC	A.EC	Overload warning 2	Does not stop
	A.ED	A.Ed	Output watt excess warning	Does not stop
	A.F0	A.F0	Tough drive warning	Does not stop

Note 1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

2. Operation to the direction which cancels the warning can be performed.

Revision history
No.LEC-OM05601
Dec./2012 1st printing
No.LEC-OM05602
Dec./2013 2nd printing
No.LEC-OM05603
Jun./2014 3rd printing
No.LEC-OM05604
Aug./2014 4th printing
No.LEC-OM05605
Oct./2014 5th printing
No.LEC-OM05606
Oct./2014 6th printing
No.LEC-OM05607
Dec./2014 7th printing

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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